READINGS ON REPORT OF

THE RAILWAY SAFETY REVIEW COMMITTEE, 1998

(SHRI H. R. KHANNA COMMITTEE REPORT, 1998)

PART I

COMPILED AND COMMENTED BY

Hari Shankar Verma, IRTS

Director General, IRITM



भारतीय रेल परिवहन प्रबंधन संस्थान

INDIAN RAILWAYS INSTITUTE OF TRANSPORT MANAGEMENT

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INDIAN RAILWAYS INSTITUTE OF TRANSPORT MANAGEMENT

(Hardoi By-Pass Road, P.O. Manak Nagar, LUCKNOW-226011, Uttar Pradesh, India.)

ISBN 978-81-966251-5-3

First Published 2024

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Printed by Maheshwari Printing Press, 289/214 Moti Nagar Chauraha, Lucknow-226004 & Bound by Rais Ahmad & Sons. 151 Phool Bagh Hussain Ganj Lucknow.

Published by

Director General,

Indian Railways Institute of Transport Management,

(Hardoi By-Pass Road, P.O. Manak Nagar, LUCKNOW-226011, Uttar Pradesh, India.)

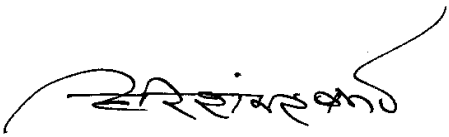
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Hari Shankar Verma, IRTS
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compiler and editor of
The Railway Accident Enquiry Committee
(popularly known as Khanna Committee)
as reading material at IRITM

हरि शंकर वर्मा
भारतीय रेल यातायात सेवा
महानिदेशक

Hari Shankar Verma
Indian Railway Traffic Service
Director General

सत्यमेव जयते

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PREFACE

Safety is integral part of railway operation. Since laying of first line of railway track, the Indian Railways is always in total commitment to provide safe, efficient, and economical rail transport in country. If any accident happens on railway system, it put a question mark on safe railway working to a common man, but it also majorly affects the moral and confidence among railwaymen. The management and staff are always working hard and in thought process to improve the safety in railways.

The training of railway staff and officers is greatly consisting of safety rules. There is no discipline in railways, where safety in rail transportation and maintenance is not taught. At Indian Railways Institute of Transport Management (IRITM), we conduct regular classes to the officers and senior supervisors about the safety and encourage the trainee officers to read and learn the material available in the library about safety.

The primary source of learning in safety are General & Subsidiary Rules (G&SR), several codes and manual, accident reports given by commissioners of railway safety and reports of past Railways Accident Enquiry Committee. Most of the literature is available with the

library but Accident Enquiry Reports are not available in physical form and there is no analysis of these reports in condensed form.

It is not possible by everyone to go through these reports in various digital platforms and read them. Some of the reports are also not available digitally and most of them are not in readable format. Secondly, the Accident Enquiry Reports are also having historical importance to learn from our past and not to repeat the same mistakes in future.

The recommendations given by various Safety Enquiries Committees are not subject to be agreed by Railway Administration at that time and carry immense value for further study and improvement in our working. Most of the reports are prepared by the best of mind during that time and worth for reading. The railway is dynamic organization which keep changing its technology over the time with progress of technology, but the lesson learned about the safety remains the same therefore it is always needed to learn the things from past.

In order to prepare reading materials to the probationary officers and in-service officers, I have read most of the reports and strongly feel that all railway officers who are working with the safety and also the officers who are holding the administrative post like Additional Divisional Railway Manager (ADRM), Divisional Railway Managers (DRMs), Principal Head of the Department (PHODs), Principal Chief Safety Officers (PCSO) of the Zonal Railways, Additional General Managers (AGMs), General Managers (GMs) and officers in Railway Board, who are in policy making must read these reports.

As a mission mode, IRITM is compiling and printing all Accident Enquiry Reports in book form for easy reading and also put digital format of the same in IRITM website to encourage and facilitate about reading of these reports. These reports would also help the researcher and policy maker to draw the policies for making Indian Railways as one of the safe Railway systems in the world.

So far Indian Railways had constituted six safety review committees since independence. The purpose of constitution of these safety review committee was to study in deep about the causes leading to railway accident and how to strengthen rail safety. The list of committees which had been formed by Ministry of Railway is as under:

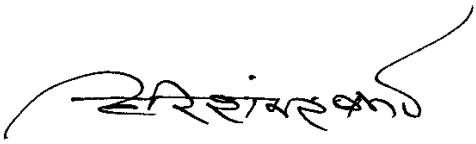
1. The Railway Accidents Enquiry Committee, 1954 **(Shahnawaz Committee 1954)**
2. The Railway Accidents Committee, 1962 **(Kunzru Committee1962)**
3. The Railway Accidents Inquiry Committee, 1968 **(Wanchoo Committee 1968)**
4. The Railway Accidents Enquiry Committee, 1978 **(The Sikri Committee 1978)**
5. The Railway Safety Review Committee **(The Khanna Committee 1998)**
6. High-Level Safety Review Committee 2012 **(Kakodkar Committee)**

High-Level Safety Review Committee, 2012 is the latest committee chaired by Dr. Anil Kakodkar. This committee is most important as it was constituted with scientists and technocrats, who were the pioneers in their

respective fields while previous committees were headed by retired supreme court judges except Shahnawaz and Kunzru Committee who were headed by parliamentarians and law makers.

While, readings of these reports, one can visit some part of history of Indian Railways and appreciate the circumstances just after our country got independence. These reports are full of events and anecdotes which remind us of things that have not changed even after passage of time. I personally feel that readers will find in them a good read.

I would like to put on record the hard work done by Mr. Rohit Yadav for formatting, proofreading, and converting it into printable format. I am also grateful to Shri Rajesh Kumar, IRTS, Sr. Professor Administration and Miss Krishna Tiwari, IRTS, Professor Administration and OSD to Undersigned for getting it published.



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Sunday, 05.09.2024, Teacher's Day.

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INTRODUCTION, BACKGROUND,
PROFILES OF CHAIRMAN AND MEMBERS,
AND ANALYSIS OF RECOMMENDATIONS OF
THE RAILWAY SAFETY REVIEW COMMITTEE, 1998

INTRODUCTION, BACKGROUND, PROFILES OF CHAIRMAN AND MEMBERS, AND ANALYSIS OF RECOMMENDATIONS OF THE RAILWAY SAFETY REVIEW COMMITTEE, 1998

I

Constitution of Committee

In view of the concern voiced by various sections of Indian society regarding train accidents and the safety performance of Indian Railways, Ministry of Railways (Railway Board) have decided to set up a High-Power Railway Safety Review Committee to go into all aspects connected with the safe running of train services in the country. The constitution of the Committee will be as follows:

Chairman

1. Shri Justice H. R. Khanna, Retired Judge of the Supreme Court

Members

2. Shri V. Dhananjaya Kumar, Member of Parliament (Lok Sabha)
3. Shri Ananta Sethi, Member of Parliament (Rajya Sabha
4. Shri CL Kaw, Retd. Chairman, Railway Board
5. Shri LK. Sinha, Retd. Member Mechanical, Railway Board
6. Shri S.M. Vaish, Retd. General Manager, Northern Railway
7. Shri V. S. Dutta, Commissioner of Railway Safety, Northern Circle

Shri Dr. Vinod Chandra, Professor, Deptt. of Elec. Engg, IIT, Delhi

One Senior Administrative Grade Officer will be appointed as Secretary of the Committee

Terms of Reference

The terms of reference of the Committee will be as under.

(a) To review the position of accidents on the Indian Railways since the appointment of the Railway Accidents Inquiry Committee, 1968 and to review the implementation of the recommendations of all previous Accident Inquiry Committees.

(b) To examine the adequacy of the existing organization, equipments and practices for ensuring safe running of trains on Indian Railways and to suggest measures for prevention of accidents,

(c) Implications of financial investment planning of Railway projects on safety; and

(d) To examine safety measures/equipments/technology as adopted by Railways of some of the advanced countries which would have relevance for Indian Railways and could also be adopted for use on Indian Railways.

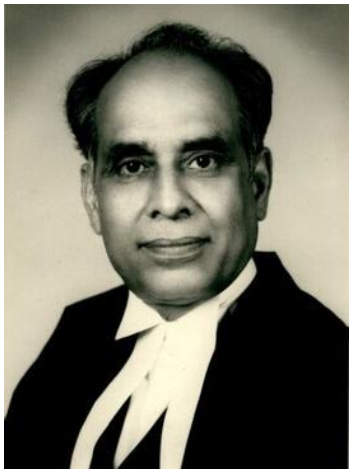
The Committee will be required to submit the report within six months of the date of its constitution.

Issued And Signed By D.P Tripathi, Secretary, Railway Board and Ex-Officio, Additional Secretary to The Government of India

The profile of Chairman

Shri Justice H. R. Khanna

Chairman, The Railway Safety Review Committee, 1998



Hans Raj Khanna (3 July 1912 – 25 February 2008) was an Indian judge, jurist and advocate who propounded the basic structure doctrine in 1973 and attempted to uphold civil liberties during the time of Emergency in India in a lone dissenting judgement in 1976. He entered the Indian judiciary in 1952 as an Additional District and Sessions Judge and subsequently was elevated as a judge to the Supreme Court of India in 1971 where he continued till his resignation in 1977.

He is most notably remembered for his minority judgment in the highly publicized ADM Jabalpur v. Shiv Kant Shukla *habeas corpus* case during the 1975 - 1977 Indian Emergency, in which the remaining four judges of the five-member bench, Chief Justice A. N. Ray, Justice M. H. Beg, Justice Y. V. Chandrachud and Justice P. N. Bhagwati, agreed with the government's view that even the fundamental rights enshrined in the Constitution of India like the right to life and liberty stood abrogated during a period of national emergency. Khanna was the lone dissenting vote; his opinion, claimed that Article 21 of the Constitution could not possibly be the sole repository of the fundamental rights to life and liberty as these predate the Constitution itself. His view that these inalienable rights cannot be deprived by executive decree, even during a period of national emergency, is praised for his 'fearlessness' and 'eloquence'.

In January 1977, nine months after delivering his dissent in the Shiv Kant Shukla case, Khanna was superseded to the office of the Chief Justice of India by Prime Minister of India Indira Gandhi in favour of Justice M. H. Beg. This went contrary to the convention of

appointing the senior-most judge as the next Chief Justice upon the retirement of the incumbent (at the time Khanna was the most senior judge in the Supreme Court). As a result of this, he promptly resigned from the court which was affected in March.

Khanna had previously authored the basic structure doctrine of the Constitution of India in *Kesavananda Bharati v. State of Kerala*, which curtailed Parliament's seemingly unfettered amending power under article 368, restricting its scope of amendment in areas which were part of the Constitution's "basic structure". In addition, he delivered noted judgments in the Ahmedabad St. Xavier's College v. State of Gujarat (1974) and State of Kerala v. N. M. Thomas (1975) cases.

After resigning from the Supreme Court, he served as the central minister of law and justice for a very short period of three days in the Charan Singh Ministry after the fall of the Indira Gandhi Government and was later made a combined opposition-sponsored candidate for election as President in 1982, losing to Zail Singh.

In 1999, he was awarded the Padma Vibhushan in recognition of his career in judicial service, the second-highest civilian honor given by the Government of India.

Early life and background

Khanna was born in Amritsar, Punjab in 1912, the son of lawyer and freedom fighter Sarb Dyal Khanna. The family hailed from a trading tradition, but Hans's father had become a leading lawyer and later, the mayor of Amritsar. Hans's mother died at a young age, and the household was run by his grandmother. Khanna took interest in law from an early age and did complete his schooling at DAV High School, Amritsar.

After completing his schooling at D.A.V. High School, Amritsar (1918–1928), He studied at the Hindu College, Amritsar, and Khalsa College, Amritsar, graduating with a Bachelor of Arts, before joining the Punjab University Law College, Lahore (1932–1934). He married Uma Mehra in 1934 at the age of 22. After completing his graduation in law, he practiced law primarily in Amritsar, dealing

mainly with civil cases, and soon gathered a large practice which he maintained till his elevation to the bench in 1952.

Early judicial career

In January 1952 he was nominated by Sir Eric Weston, Chief Justice of Punjab, as District and Sessions Judge. This was "an uncommon appointment.... it had long been the practice to appoint only from the civil service". He served in the district courts at Ferozepur, and then Ambala.

He became known for his decision to convict India's leading industrialist Ramkrishna Dalmia of corruption. Dalmia was to serve several years in Tihar Jail.

He moved as District and Sessions Judge, Delhi until he was appointed Judge of the Punjab High Court in 1962. On the formation of the Delhi High Court, he joined the bench as one of its first judges. He conducted the inquiry into corruption charges against Biju Patnaik and other Ministers in Orissa. While some of the charges were found true, Biju himself was absolved. He served as Chief Justice of Delhi High Court from 1969 until September 1971 when he was appointed a Judge of the Supreme Court of India.

Judge of the Supreme Court

Keshavananda Bharati v. State of Kerala (Basic Structure Doctrine)

While the Habeas Corpus case is Justice Khanna's most celebrated ruling, almost as well known is his judgment in the landmark case of Kesavananda Bharati. In 1973, the Supreme Court constituted its largest-ever bench of 13 judges to decide whether Parliament had the unfettered right to amend the Constitution or not. On 24 April 1973, seven out of 13 judges held that Parliament's power to amend the Constitution was limited. Six other judges in the case were of the view that Parliament's power was unrestricted. Justice Khanna's judgment held that, although the Constitution is amenable to amendments, changes that ultra vires, tinker with its *basic structure* cannot be made by Parliament, that is – certain parts of the constitution were "basic" and could not be amended. However, he also said the amendment of the right was fundamental – as he

explained, "If no provisions were made for amendment of the constitution, the people would have recourse to extra constitutional method like revolution to change the constitution".

The judgment clarified and partially overruled the court's earlier verdict in Golak Nath by holding that Parliament could amend the Constitution, particularly the property right.

The Habeas Corpus Case

Justice Khanna is renowned for exhibiting immense courage during the Indian Emergency (1975–1977) declared by Indira Gandhi.

The emergency was declared when Justice Jagmohanlal Sinha of the Allahabad High Court invalidated the election of Indira Gandhi to the Lok Sabha in June 1975, upholding charges of electoral fraud, in the case filed by Raj Narain.

Owing to the repressive Maintenance of Internal Security Act (MISA) which provided for the unlawful detainment of individuals without trial, several high courts had given relief to the detainees by accepting their right to habeas corpus as stated in Article 21 of the Indian constitution. This issue was at the heart of the case of the *Additional District Magistrate of Jabalpur v. Shiv Kant Shukla*, popularly known as the *Habeas Corpus case*, which came up for hearing in front of the Supreme Court in December 1975. Given the important nature of the case, a bench comprising the five seniormost judges was convened to hear the case.

During the arguments, Justice Khanna at one point asked the Attorney General Niren De: "Life is also mentioned in Article 21 and would Government argument extend to it also?". He answered, "Even if life was taken away legally, courts are helpless".

The bench opined in April 1976, with the majority deciding against habeas corpus, permitting unrestricted powers of detention during an emergency. Justices A. N. Ray, P. N. Bhagwati, Y. V. Chandrachud, and M.H. Beg, stated in the majority decision:

Given the Presidential Order [declaring emergency] no person has any locus to move any writ petition under Art. 226 before a High Court for habeas corpus or any other writ or order or direction to challenge the legality of an order of detention.

Justice Beg even went on to observe: "We understand that the care and concern bestowed by the state authorities upon the welfare of detenues who are well housed, well-fed, and well-treated, is almost maternal."

However, Justice Khanna resisted the pressure to concur with this majority view. He wrote in his dissenting opinion:

The Constitution and the laws of India do not permit life and liberty to be at the mercy of the absolute power of the Executive . . . . What is at stake is the rule of law. The question is whether the law speaking through the authority of the court shall be silenced and rendered mute... detention without trial is an anathema to all those who love personal liberty.

In the end, he quoted Justice Charles Evans Hughes:

A dissent is an appeal to the brooding spirit of the law, to the intelligence of a future day, when a later decision may correct the error into which the dissenting judge believes the court to have been betrayed.

Before delivering this opinion, Justice Khanna mentioned to his sister: *I have prepared my judgment, which is going to cost me the Chief Justiceship of India.*

Aftermath of the judgment

True to his apprehensions, his junior, M. H. Beg, was appointed Chief Justice in January 1977. This was against legal tradition and was widely protested by bar associations and the legal community. Justice Khanna resigned on the same day. After his resignation Bar Associations all over India, in protest, abstained from the courts and took out black-coat processions, though to no avail. However, this was the last supersession in the history of the Supreme Court, and eventually, the judiciary even wrested the power of judicial appointments from the executive in a landmark ruling in the *Advocates-on-Record* case in 1993 (also known as the Second Judges Case).

The New York Times, wrote at the time:

> If India ever finds its way back to the freedom and democracy that were proud hallmarks of its first eighteen

> years as an independent nation, someone will surely erect a monument to Justice H R Khanna of the Supreme Court. It was Justice Khanna who spoke out fearlessly and eloquently for freedom this week in dissenting from the Court's decision upholding the right of Prime Minister Indira Gandhi's Government to imprison political opponents at will and without court hearings... The submission of an independent judiciary to an absolutist government is virtually the last step in the destruction of a democratic society, and the Indian Supreme Court's decision appears close to utter surrender.

This judgment has been consistently lauded by lawyers, scholars, and intellectuals alike and has been compared to the dissent of Lord Atkin in Liversidge v Anderson.

Nani Palkhivala's book, which came out soon after the emergency was revoked, carried a full-fledged chapter on him titled, "Salute to Justice Khanna". At one point in the chapter, he says of Justice Khanna, "his statue must be installed in every street and corner of the country for the yeoman service rendered by him for the cause of justice".

In December 1978, his full-size portrait was unveiled in his former court, courtroom number 2 of the Supreme Court. To this day, nobody else has had the singular honor of having their portrait put up in the Supreme Court during their lifetime.

In fact, when the Supreme Court Bar Association asked for contributions from its members to collect Rs 10,000 for the portrait, within half an hour Rs 30,000 was on the table and the members of the bar had to be forcibly stopped.

Post-judicial career

Upon the suspension of the emergency, the Janata Party which was preparing for the impending elections urged him to contest them, but he refused and preferred instead to carry on chamber practice. He was highly active with it, taking international arbitrations into his early nineties.

After Indira Gandhi lost the elections of 1977, the ruling Janata Party wanted him to head the Commission of Inquiry against the

illegal imposition of the emergency and the various atrocities committed during it, but Khanna refused, as he felt he would appear biased against Indira Gandhi and her son Sanjay Gandhi.

He was then offered the Chairmanship of the Finance Commission, a position he also refused. He did however accept the office of Chairman of the Law Commission, a post he held without any pay. He resigned from its chairmanship in 1979 when he was inducted into the cabinet as Union Law Minister by Charan Singh. However, he resigned within 3 days. As it so happened, the entire government fell within six months.

In 1982 Khanna was nominated for President of India, as a combined opposition candidate supported by as many as nine opposition parties. However, the Congress Party had a huge majority numerically and he lost to Giani Zail Singh.

From 1985 until 2000, he was the national president of the Bharat Vikas Parishad, after which he became patron to the organisation. He was a long-time board member of, and for many years the chairman of the Press Trust of India.

In 1998, the Justice HR Khanna committee was constituted by the railway ministry with the mandate of "reviewing the implementation of previous accident inquiry committees, of examining the adequacy of existing practices for the safe running of trains and to suggest safety measures." Under his chairmanship, the Railway Safety Review Committee made 278 recommendations, out of which 239 were accepted by the railways.

In 2001 he chaired the advisory panel to the Government of India on strengthening the institutions of parliamentary democracy.

A prolific writer, he also lectured regularly and many of his lectures were later published in book form. Among the books he has authored, are "Judicial Review or Confrontation" (1977), *Constitution and civil liberties* (1978, based on the B. R. Ambedkar memorial lectures), *Making of India's Constitution* (1981, based on the Sulakshani Devi Mahajan lectures), "Judiciary in India and Judicial Process" (1985, based on the Tagore Law Lectures), Liberty, Democracy and Ethics, Society and the Law, which mainly

deal with Indian law and the constitution. He also wrote an autobiography, *Neither Roses nor Thorns*, (Lucknow, 1985).

In the conclusion of his *Making of India's constitution*, he writes:

> If the Indian constitution is our heritage bequeathed to us by our founding fathers, no less are we, the people of India, the trustees, and custodians of the values which pulsate within its provisions! A constitution is not a parchment of paper, it is a way of life and has to be lived up to. Eternal vigilance is the price of liberty and in the final analysis, its only keepers are the people. The imbecility of men, history teaches us, always invites the impudence of power."

He published his autobiography, *Neither Roses Nor Thorns* in 2003. Khanna died on 25 February 2008 at the age of 95.

Honours and tributes

The government of India honored him with the Padma Vibhushan, India's second-highest civilian award, in 1999.

He has been awarded honorary Doctor of Law degrees by numerous universities, including Faculty of Law, University of Delhi, National Law School of India University, Government Law College, Mumbai, University of Calcutta and his alma mater Panjab University.

On the occasion of his 90th birthday, the Supreme Court Bar Association presented him with a plaque conferring upon him the title of "Living Legend of Law".

Two sets of lectures are held in Justice Khanna's honor.

A series of lectures were organized by Justice Khanna's family for some years after his death but were subsequently discontinued. They were presided over by Soli Sorabjee, who was a very close friend of Justice Khanna's.

The first lecture was delivered by Justice M.N. Venkatachaliah, on the topic "The Constitutional World of Justice Khanna". In 2010, the speaker was K.K. Venugopal. The third installment in 2011 was delivered by Justice Santosh Hegde. In 2012, the last in this succession of lectures, the H.R. Khanna Centennial Memorial

Lecture was held – the speakers of which were Justice J.S. Verma and B G Verghese.

The KIIT Law School also holds an H.R. Khanna Memorial Lecture. The first one was delivered by Gopal Subramaniam, in 2011 on the topic "Legal and Political Processes in Modern Indian Democracy". It was presided over by Justice Ranganath Misra. The same lecture for the year 2012 was delivered by Justice Dipak Misra.

International Journal of Law & Management Studies holds an Essay Competition in honor of Justice Khanna called the IJLMS Justice H.R. Khanna Memorial Essay Competition in May annually. The First Edition of this competition was held in association with IPMarkets, Hyderabad.

The profile of Member

Shri V. Dhananjaya Kumar, Member of Parliament (Lok Sabha)

Member, The Railway Safety Review Committee, 1998



Venur Dhananjay Kumar Alva (4 July 1951 – 4 March 2019) was a former Union and Cabinet minister of India and a former Member of Parliament from Mangalore. He was cabinet minister for Civil Aviation and Tourism in 1996, Union Minister of State for Finance from 1999 to 2000 and Union Minister of State for Textiles from 2000 to 2003. He was also one of the first few BJP MPs to be elected from south India, at a time when the Congress party's reach was at its peak.

Kumar went on to represent the Mangalore constituency in the Lok Sabha for four successive terms. Earlier in 1983, he was elected as a BJP MLA from Mangalore City assembly constituency comfortably defeating sitting MLA from Congress, P. F. Rodrigues, even before he became an MP. Being a staunch loyalist of former Chief Minister of Karnataka B. S. Yeddyurappa, he was elected as the president of the new Karnataka Janata Party. He was the Special representative

of the Government of Karnataka to the Union Government in New Delhi.

Biography

Born in Venur, a small town of erstwhile South Canara in 1951, Kumar earned degrees in science from Sri Mahaveera College, Moodabidri and law from Udupi Law College and held a number of influential positions in a political career that spanned decades. A firm believer of the RSS' Hindutva ideology, Kumar began his political career in the youth wing of Bharatiya Janta Party and later went on to become a Member of the Karnataka Legislative Assembly in 1983. In 1991, he was elected to the 10th Lok Sabha defeating the Congress stalwart Janardhana Poojary, Union Minister of State for Finance during the tenure of Indira Gandhi and Rajiv Gandhi.

With the rise of the Bharatiya Janta Party in Karnataka, Kumar went on to represent the Mangalore (Lok Sabha constituency) for four successive terms and served as Union Minister, thrice in the Government of India when the Bharatiya Janata Party was in power. He was cabinet minister for Civil Aviation and Tourism in 1996, Union Minister of State for Finance from 1999 to 2000 and Union Minister of State for Textiles from 2000 to 2003. Despite being a sitting MP, he was denied ticket for 2004 Loksabha election from Mangalore, instead D. V. Sadananda Gowda was preferred. During Yeddyurappa's tenure as chief minister between 2008 and 2011, Kumar became the State party head.

He was known for being staunchly loyal to BJP state president BS Yeddyurappa. After leaving the saffron party with B. S. Yeddyurappa, a former chief minister of Karnataka, Kumar was instrumental in starting a new political outfit, Karnataka Janata Party. Dhananjay was even made the state president of the party. He was unable to actively participate due to ill health.

Kumar died at Unity Hospital in Mangalore on 4 March 2019 after a prolonged illness due to kidney problem.

The profile of Member
Shri Ananta Sethi, Member of Parliament (Rajya Sabha)
Member, The Railway Safety Review Committee, 1998



Ananta Prasad Sethi (born 17 July 1951) is an Indian politician active in Odisha politics as a worker of the Indian National Congress. He was a Lok Sabha MP from 1984 to 1989, elected from Bhadrak (SC) and a member of the Odisha Legislative Assembly from 2004 to 2009, elected from Bhandaripokhari.

Summary of Recommendations

The Committees earlier appointed to enquire into the Safety situation on IR were required to report on the implementation of recommendations of the previous Committee. This they did.

In the case of our Committee, the Government made a departure & asked for "review of the implementation of all previous Accident Inquiry Committees". This stems from concern regarding the safety situation on IR. Perhaps it was felt that implementation was deficient.

(Para No. 5.1.2 of RSRC, 1998 (Khanna Committee))

Our study of this most important element of the improvement process confirms the view that **much more needs to be done regarding the recommendations of all Safety Committees than has been achieved so far**. This is not to take away from the fact that quite a lot has been done. (Para No. 5.1.3 of RSRC, 1998 of (Khanna Committee)

It is really the plethora of other activities, the tight financial situation, politically motivated decisions, the deteriorating law & order situation, the general lax environment in the country and scores of well-known factors which make all Government (of which IR is a department) activity somewhat slow. Subterfuge then becomes practice. (Para No. 5.1.4 of RSRC, 1998 (Khanna Committee))

It is in the light of these facts that our committee has placed 'IMPLEMENTATION' as the first and most important recommendation (see Chapter-II). Some details have been spelt out so that the process gets institutionalized at several levels and accountability becomes clear from the suggested records. **It is felt that periodic verification of implementation on the ground is the only path to real improvement.**

(Para No. 5.1.5 of RSRC, 1998 (Khanna Committee))

In its pursuit of showing improvement in the implementation process, the Ministry of Railways found many methods of showing progress in Implementation, which are enumerated below; -

(i) Recommendations were treated as implemented purely on the grounds that necessary instructions had been issued by the Railway Ministry to the Zonal Railways. For instance, the Sikri Committee (Recommendation 65 in Part I) had enjoined upon the

Railways the need to improve the overall conditions in the running rooms. This recommendation was treated as implemented as "necessary instructions had been issued to Zonal Railways." Similarly, issue of instructions was given as evidence of implementation of recommendations such as: the need to ensure against shortages of staff in safety categories (Recommendation No.66 of Sikri Part I); provision of proper equipment and training to gateman (Recommendation No.80 of Sikri Part I); the importance of ensuring that wagons with "rejectable" defects are not turned out of shops (Recommendation No.164 of Sikri Part I); curb on the practice of examining goods loads on the sorting lines (Recommendation No.204 of Sikri Part II); Divisional Safety Officers to be relieved of miscellaneous functions (Recommendation No.249 of Sikri Part II); safety counsellors to be given appropriate training in counselling techniques (Recommendation No.248 of Sikri Part II).

(ii) Recommendations have been treated as implemented with the commissioning of trials, even when it was apparent that actual implementation was still many years down the road. An example of this type is the Railway's response to the Sikri Committee recommendation (no. 127 of Part I) urging the Railways to ensure that no locomotive which is to work a train leaves the shed or yard without speedometer/speed recorder in working order. This recommendation, which even today remains only partially implemented, was treated as implemented "in view of the policy decision of the Board to fit all new main line locos with Hasler speed recorders. In similar vein, the Sikri Committee recommendation (no 81 of Part II) that development and manufacture of thick-web turn outs should be undertaken on priority, was treated as implemented on the basis of trials being conducted in 1986. The Sikri Committee recommendations regarding electric lighting of semaphore signals (No. 134 of Part II), communication between driver, guard and SM (No.175 of Part II) were also disposed off in similar manner.

(iii) Some recommendations were treated as implemented even when there was no implementation. Among the recommendations that fall in this category is the Sikri Committee recommendation (No. 95 of Part II) that Railways should make use of AWS on track for protection of speed restrictions on sections where the AWS system is operative. This recommendation was shown as "implemented being long term process", although even today this provision is not available on the AWS system of the Bombay suburban network. On a similar note, the Sikri Committee recommendation (No. 141 of Part I) that BOX wagons should not be loaded beyond their carrying capacity has been treated as implemented, although there are instructions to the effect that BOX wagons can be loaded up to 2 tonnes above their carrying capacity.

(Para No. 5.1.6 of RSRC, 1998 (Khanna Committee))

From the stockpile of recommendations made by the Kunzru, Wanchoo and Sikri Committees, we have identified the issues that are of deep significance to safety on the Railways today. Considering that the Kunzru Committee submitted its report almost four decades ago and even the last, i.e. the Sikri Committee Report is twenty years old, many safety issues that were relevant to those Committees have become dated due to attrition and technological obsolescence. For instance, steam locomotives, which were a major concern of the earlier Committees, are now a relic of the past. Whereas there are numerous shortcomings in implementation due to a variety of reasons, we cannot fail to mention the considerable work done by the Railways on many recommendations such as setting up of training institutions for certain safety categories of staff, welding of rails into longer lengths, handbooks for staff of essential safety categories.

(Para No. 5.1.7 of RSRC, 1998 (Khanna Committee))

Keeping all these points in view, what we have done is to study the trajectory of the implementation of the earlier Committees important recommendations that are of relevance today. Instead of assessing the recommendations of each Committee in isolation, we have looked at all significant issues of safety raised by the three Committees in their

entirety through a historical survey of the views of each Committee on every relevant subject and the Railways' response thereon. Such an approach of sequential narration ensures that we cover each subject fully.

(Para No. 5.1.8 of RSRC, 1998 (Khanna Committee))

Track Circuiting

Reference: Kunzru (Recommendation No.84 of Part II); Wanchoo (Recommendation No.169 of Part 1, Recommendation Nos. 116 & 144 of Part II); Sikri (Recommendation 116 of Part 1, Recommendation No. 149 of Part II)

Successive Committees of Enquiry, the Railway Reforms Committee, the Commissioners of Railway Safety, the Standing Committee of Parliament on Railways of Eleventh Lok Sabha, had all emphasized the importance of extending track circuiting at all stations as a basic safety requirement. The Railway management, in turn, wholeheartedly accepted track-circuiting as an essential safety aid. But the erratic progress of track circuiting through the decades provides a striking example of the Railways' inadequate response to the recommendations of earlier Committees.

(Para No. 5.2.1 of RSRC, 1998 (Khanna Committee))

The Kunzru Committee had recommended that track circuiting should be extensively provided at stations as this device would almost completely eliminate collisions due to a second train being received on an occupied line. This Committee also urged the Railways to research and overcome the difficulties caused due to the paucity of wooden or concrete sleepers. It was also recommended that at large stations and yards, "the provision of route relay interlocking should be considered as an essential measure". At that time, the Railway administration responded with a general statement of intent that track circuiting would be provided "to the maximum extent possible", and that Zonal Railways would be asked to keep the Kunzru Committee's recommendation regarding route relay interlocking in view while making proposals for signalling works."

(Para No. 5.2.2 of RSRC, 1998 (Khanna Committee))

The Wanchoo Committee noted that the progress in track circuiting had been unsatisfactory: "we cannot help expressing our doubts whether Railways are addressing themselves to the task of providing track-circuiting with the necessary sense of urgency. The Railway Board had indicated that a target of track circuiting 200 stations every year had been fixed, but the actual execution was far short of this target. (Para No. 5.2.3 of RSRC, 1998 (Khanna Committee))

An important issue raised by the Wanchoo Committee was that track circuiting should cover the station area between the block clearance points instead of track circuiting only between fouling marks. (Para No. 5.2.4 of RSRC, 1998 (Khanna Committee))

The Sikri Committee also raised the issue of track circuiting between block clearance points and urged that "the portion between fouling marks and advanced starter at stations on trunk routes and main lines must be provided with track circuiting on high priority. Constraint of funds and materials must not be allowed to stand in the way." The Railway Reforms Committee and the Parliament's Standing Committee on Railways (1995-96) also strongly emphasized the need for track circuiting between block section limits on all trunk routes and main lines. It is true that the execution of track circuiting work was slow. After the Ferozabad accident in August 1995 there has been good progress.

(Para No. 5.2.5 of RSRC, 1998 (Khanna Committee))

In Chapter II, Committee has indicated what we consider should be the route-wise priorities and target year of completion for track circuiting of stations.

(Para No. 5.2.6 of RSRC, 1998 (Khanna Committee))

Auxiliary Warning System/Automatic Train Control/Cab Signalling (Para no. 5.3)

Reference: Kunzru (Recommendation No.85 of Part I); Wanchoo (Recommendation No. 170 of Part 1, Recommendation Nos. 148, 149 & 150 of Part II); Sikri (Recommendation No. 117 of Part I and 156 of Part II)

The Railways can feel justifiably aggrieved that Committees of Inquiry have at times recommended the latest state-of-the-art devices for induction on IR without taking into account the financial implications, or the system's capability of absorbing the new technology. To make matters worse, the Railways has readily accepted such recommendations without fully analyzing the feasibility of implementation, as a consequence of which the Railways finds itself unable to show significant compliance. The slow progress of AWS/ATC reflects this dilemma of IR.

(Para No. 5.3.1 of RSRC, 1998 (Khanna Committee))

The Kunzru Committee had first suggested that automatic train control should be introduced on some suburban sections and specially selected trunk routes. The Committee also urged the Railways to undertake research for adapting the ATC in use in advanced Railway systems to Indian conditions and also suggested introduction of cab-signalling as an experimental measure.

(Para No. 5.3.2 of RSRC, 1998 (Khanna Committee))

The Wanchoo Committee felt that Indian Railways had not reacted positively to the adoption of ATC. The Committee opined that "if the trial and Installation of ATC been initiated earlier, certain signalling firms in India would have become interested in this field of manufacture already. The Wanchoo Committee made a specific recommendation that on sections with speeds of 100 kmph or over, ATC should be provided. According to the Committee, "as a means to prevent accidents, ATC is only second, if even second, in importance to track circuiting."

(Para No. 5.3.3 of RSRC, 1998 (Khanna Committee))

The Railways' response to the recommendations of the Wanchoo Committee was quite impressive. It was stated that "besides Howrah-

534 The Railways' response to the recommendations of the Wanchoo Burdwan and Mughalsarai-Gaya sections of Eastern Railways, provision of AWS has been sanctioned for suburban sections of Central and Western Railways also." It was further stated that for providing AWS equipment, priority would be given to suburban sections and trunk routes on which trains run at speeds of 120 kmph and more, with AWS being provided on locomotives of Mail/Express trains and EMUs, although the Wanchoo Committee had recommended that even goods trains be covered. Nevertheless, the Railways' plan outlined above for inducting AWS could not be faulted. (Para No. 5.3.4 of RSRC, 1998 (Khanna Committee))

The Sikri Committee criticized the poor progress in installation of AWS, which it attributed to "reluctance to import the equipment and to excessive time taken for its indigenous development and manufacture". It called upon the Railway Board to "take steps to fulfill at least their diluted commitment of providing AWS on trunk routes and suburban sections at the earliest." Although the Committee was aware of the tardy progress of AWS, it recommended a considerable enhancement in the spread of AWS: "a programme should be drawn up for extending AWS on all trunk routes with speeds of 100 kmph and above, covering all passenger and goods trains." The Railways accepted this recommendation without any reservations, and on the basis of work in progress on Howrah-Burdwan section of Eastern Railway and Church gate-Virar section of Western Railway, the recommendation was treated as implemented. (Para No. 5.3.5 of RSRC, 1998 (Khanna Committee))

The Railways are already committed to providing AWS on all suburban sections and trunk routes with speeds of 100 kmph and above which should cover all passenger and goods trains. But almost four decades after this issue was first raised by the Kunzru Committee, AWS has been installed only on the suburban systems of Central and Western Railways. Here too, the AWS system only covers the EMU services but not the other services, not even Mail/Express trains. Perhaps the problem of pilferage of the track magnet of AWS which was encountered in the eastern part of the country was responsible for the

delay. The view of our Committee is that despite the importance attached to AWS by previous Committees, the Railways have made very slow progress in extending the use of this vital safety device. Our specific recommendations on the issue are indicated in Chapter II where the issue of pilferage has been taken into account. (Para No. 5.3.1 of RSRC, 1998 (Khanna Committee))

Train Actuated Warning Device/Automatic Lifting Barriers

Reference: Kunzru (Recommendation No.7 of Part II); Wanchoo (Recommendation Nos. 162 & 163 of Part I, Recommendations Nos. 122, 123 & 124 of Part II); Sikri (Recommendation Nos. 103 & 104 of Part I, Recommendation Nos. 118 & 123of Part II)

(Para No. 5.4 of RSRC, 1998 (Khanna Committee))

The Kunzru Committee, adverting to methods of level crossing gate protection in use in Europe and America, recommended that Indian Railways should make determined efforts to install fail-safe automatic barriers to suit Indian conditions, which would be automatically closed when a train is at a pre-determined distance from the LC gate. The Committee also suggested that the provision of bells and flasher signals at LC gates should be investigated by RDSO.

(Para No. 5.4.1 of RSRC, 1998 (Khanna Committee))

Despite the stand taken by the Railway Board that automatic half barriers were not suitable for Indian conditions, the Wanchoo Committee recommended that the Railways should continue experimenting with automatic half-barriers as a substitute for manned level crossings. However, with regard to the train actuated audio-visual warning device at unmanned level crossings, the Committee, in sharp contrast to the stand taken by the Kunzru Committee, expressed the view that such audio-visual warning was not of practical value in Indian conditions, and that the onus for safe passage across unmanned LCS should rest squarely with the road users. (Para No. 5.4.2 of RSRC, 1998 (Khanna Committee))

The Sikri Committee recommended adoption of both automatic half-barters and the train actuated warning device (TAWD). The Committee felt that as the one trial Installation of automatic barriers on Northern

Railway was sections away from metropolitan cities. The provision of TAWD was recommended in the first stage at all manned LCs in mid-section. Neither of these two recommendations was accepted by the Ministry of Railways on the grounds that these devices were unworkable in Indian conditions. (Para No. 5.4.3 of RSRC, 1998 (Khanna Committee))

There has since then been a change in the Railways' thinking on the TAWD, quite obviously because of the increase in number of level crossing accidents, particularly at unmanned gates. It is understood that the TAWD with audio-visual indication has been sanctioned at 10 level crossing gates each on Eastern and Western Railways.

(Para No. 5.4.4 of RSRC, 1998 (Khanna Committee))

On the issue of TAWD, we have given our recommendations in Chapter III. (Para No. 5.4.5 of RSRC, 1998 (Khanna Committee))

Overaged Signalling Gear

Reference: Kunzru (Recommendation No.86 of Part II); Wanchoo (Recommendation Nos 1) 173 & 174 of Part 1); Sikri (Recommendation No.124 of Part 1 (Para No. 5.5 of RSRC, 1998 (Khanna Committee))

The Kunzru Committee had observed that unless overhaul and replacement of lever frames and worn-out signalling gear are done according to the prescribed schedules, "signalling failures would continue to increase thereby reducing the factor of safety in rail operation."

(Para No. 5.5.1 of RSRC, 1998 (Khanna Committee))

The Wanchoo Committee had also stressed the importance of clearing the shortfall in replacement programmes for lever frames and block instruments. In July 1969, the Railway Board advised the Zonal Railways that whenever signalling equipment needed replacement on age-cum-condition basis, replacement should be carried out early so that safety was not compromised. (Para No. 5.5.2 of RSRC, 1998 (Khanna Committee))

However, notwithstanding the guidelines issued by the Railway Board, there was further increase in the arrears of signalling gear due replacement, which prompted the Sikri Committee to state that the Wanchoo Committee's recommendations on the subject "not only remain unimplemented but there has been a distinct deterioration in the situation..... On the basis of instructions issued on the subject by the Railway Board to the Zonal Railways and considering the fact that "implementation was also of continuous nature", this recommendation was treated as implemented.

(Para No. 5.5.3 of RSRC, 1998 (Khanna Committee))

Our Committee has, in Chapter II, underlined the importance of replacing overaged signalling gear within a fixed timeframe. According to information furnished by the Ministry of Railways, there are at present 1560 stations where signalling gear are overdue replacement. When one considers that the Sikri Committee was sharply critical of the Railways for not ensuring timely replacement of signalling gear on account of which the Railways had accumulated arrears of 101 lever frames overdue replacement, the present status of signalling gear overdue replacement becomes a matter of grave concern. Our Committee once again reiterates the urgent need to pull up the arrears in replacement of signalling gear overdue replacement. (Para No. 5.5.4 of RSRC, 1998 (Khanna Committee))

Separation of Warner from Outer Signal/Provision of Multiple Aspect Signalling

Reference: Wanchoo (Recommendation Nos. 133 & 134 of Part II); Sikri (Recommendation Nos. 108 & 109 of Part 1)

The Wanchoo Committee, while stressing the need to provide multiple aspect signalling at all stations on trunk routes and main lines, had recommended that as an interim measure, the warner should be separated from the outer signal and placed at a distance of 1.5 kms outside the outer signal so that the drivers of trains get a pre-warning before the first stop signal. (Para No. 5.6.1 of RSRC, 1998 (Khanna Committee))

The Sikri Committee found that despite having accepted the recommendation of the Wanchoo Committee, there had been no significant progress in separation of warners from outer signals. The Committee also felt that the Railway Board needed to take up provision of multiple aspect signalling at the remaining stations on trunk routes and main lines as early as possible.

(Para No. 5.6.2 of RSRC, 1998 (Khanna Committee))

The Railway Ministry's written response to the Sikri Committee recommendation on the warner signal was not satisfactory. The Ministry stated that "Zonal Railways had not come up with a proposal of separation of warmer signal which indicated that they do not consider it necessary", implying thereby that even a recommendation that had been accepted could be implemented only if endorsed by the Zonal Railways. In reply to our questionnaire, the Zonal Railways (excluding South-Eastern and Western Railways) have indicated that there are still as many as 960 stations where the warner is placed below the outer signal. From these figures it is apparent that the Railways have not seriously addressed the issue of separating warners from the outer signals.

(Para No. 5.6.3 of RSRC, 1998 (Khanna Committee))

Our Committee has been advised that the entire 'A' route of Indian Railways has been provided with multiple aspect signalling. We would urge the Railways to provide multiple aspect signalling on the 'B' route within the next five years. This issue would be discussed in detail in our final report. (Para No. 5.6.4 of RSRC, 1998 (Khanna Committee))

Track Renewals

Reference: Kunzru (Recommendation Nos. 16, 96, 97, 98 of Part II); Wanchoo (Recommendation No.141 of Part 1); Sikri (Recommendation Nos. 84 & 85 of Part 1, Recommendation No.71 of Part II)

In order to underline the importance of timely track renewals, the Kunzru Committee reproduced the following observation made by the Estimates Committee in their Twenty first Report, 1955-56: “the Committee are definitely of the opinion that topmost priority should be given to wipe out areas of track renewals. Endorsing this view, the

Kunzru Committee felt that non- fulfillment of the track renewal programme on certain Railways was responsible for a large number of derailments due to track defects. Apart from the implications on safety, track renewals would also reduce the length of track under speed restriction on the Railways.

(Para No. 5.7.1 of RSRC, 1998 (Khanna Committee))

The Railways responded positively to this recommendation by pulling up the arrears in track renewals, a fact noted with appreciation by the Wanchoo Committee which commended the progress made on track renewals. The Committee expressed the hope that the pace of renewals would be maintained. (Para No. 5.7.2 of RSRC, 1998 (Khanna Committee))

According to the Sikri Committee, not only were the hopes of the Wanchoo Committee belied, "but the position has deteriorated considerably and its ill-effects are becoming apparent from the rising incidence of rail breakages and imposition of speed restrictions on increasing length of track." The Committee was concerned that the actual allocation of funds for track renewals was much less than the requirement, and emphasized the need to provide the full requirement so that the arrears are wiped out early. On account of the inadequate outlays, the backlog of primary renewals which was about 2400 Kms in 1974, had increased to about 6000 Kms in 1978. The Committee stressed that "requirement of funds for track renewals should be viewed by Government as an essential input for safety and should get commensurate priority." The Ministry of Railways treated this recommendation as implemented in 1986 with the following remarks: "Every effort was being made to allot maximum possible funds for track renewals, hence treated as implemented." (Para No. 5.7.3 of RSRC, 1998 (Khanna Committee))

The fears expressed by the Sikri Committee that unless larger financial allocations for track renewals are made, the backlog will get totally out of hand, has now become a grim reality. We have already referred to the huge arrears in track renewal of more than 12,000 Kms, which excludes loop lines and yard lines. It is clear that Railways is not in any position

to bridge the gap from its own financial resources. As suggested by the Committee in Chapter II, the Central Government will need to lend a helping hand. (Para No. 5.7.4 of RSRC, 1998 (Khanna Committee))

Ballasting

Reference: Kunzru (Recommendation No. 101 of Part II); Wanchoo (Recommendation No. 145 of Part I); Sikri (Recommendation No. 86 of Part II)

The Kunzru Committee attached high priority to the adequacy and quality of ballast as a means for ensuring safe and satisfactory behaviour of track. Even at that time the Committee recognized that with introduction of concrete sleepers and mechanical tamping, there was vital need for the right type and quantity of ballast. The Committee, however, observed that the recoupment of ballast on IR was extremely unsatisfactory and demanded vigorous action for ensuring a ballast cushion of 10" on important routes. For this purpose, it urged the Railways to ensure adequate supply of hoppers for training out ballast, motor trucks for collection of ballast on the cess, and installation of mechanical crushers at suitable locations. (Para No. 5.8.1 of RSRC, 1998 (Khanna Committee))

The Wanchoo Committee noted that while the Railways had improved the training out capacity by increasing the fleet of hopper wagons, there was still a problem of shortage of ballast as also deficiency of clean ballast in many sections. The Committee felt that the Railways should increase the annual procurement of clean ballast to make good the shortfall. The Ministry of Railways treated this recommendation as implemented by stating that adequate availability of ballast was being ensured to meet the annual requirements for normal recoupment, track renewals, and for ensuring ballast cushion.

(Para No. 5.8.2 of RSRC, 1998 (Khanna Committee))

According to the assessment made by the Sikri Committee, the total quantity of ballast procured on all Railways from 1973-74 to 1977-78

averaged 2.68 million cubic meters per annum, which indicated that the procurement was not adequate even for recoupment. The Committee urged the Railways to ensure recoupment of ballast according to the accepted norms as also to streamline the working of ballast trains. The Ministry of Railways' response was that this recommendation had been already implemented in spirit."

(Para No. 5.8.3 of RSRC, 1998 (Khanna Committee))

Our committee is aware that there are large stretches of track on Indian Railways having scanty ballast, with Zonal Railways reporting shortages varying from 15 to 35 percent. There is also a large percentage of "caked" ballast on track. Ballasting is a major problem and our recommendations on the subject are given in Chapter II.

(Para No. 5.8.4 of RSRC, 1998 (Khanna Committee))

Ultrasonic Testing

Reference: Wanchoo (Recommendation No.105 of Part II); Sikri (Recommendation Nos. 98, 99 & 103 of Part II)

Recognizing the limitation of visual examination of rails which cannot detect many defects, the Wanchoo Committee felt that ultrasonic rail flaw detectors were essential for checking of rails. The Committee recommended that the Railways should procure an adequate number of these devices. The periodicity of ultrasonic examination visualized by the Committee was annual testing, "though more frequent testing could be carried out where track conditions so warrant."

(Para No. 5.9.1 of RSRC, 1998 (Khanna Committee))

The Sikri Committee, citing increase in derailments due to rail fractures on IR during the period 1973-74 to 1977-78, urged the Railways to intensify ultrasonic testing of rails. This Committee made a number of invaluable suggestions to improve the system of rail flaw detection which included the following measures:

(i) every new rail should be ultrasonically tested before being put on track;

(ii) schedules should be prescribed for testing of different types of track with ultrasonic rail flaw detectors;

(iii) provision of adequate number of rail flaw detectors on each division;

(iv) development of facilities for repair, maintenance and periodic calibration of the machines; (v) detectors to be provided with an arrangement for recording the flaws. It is significant that the Sikri Committee had highlighted all the most pertinent issues relating to ultrasonic testing. But it is unfortunate that the Railways are only now showing the necessary sense of urgency to streamline this critical activity. The recent catastrophe involving Golden Temple Mail and Sealdah Express near Khanna on Northern Railway in November 1998 and the accident of Godavari Express near Kazipet on South Central Railway in June 1999 have exposed the infirmities in the existing system of ultrasonic testing. Our recommendations on the subject are given in Chapter II.

(Para No. 5.9.2 of RSRC, 1998 (Khanna Committee))

Speed Recorders/Speedometers

Reference: Kunzru (Recommendation No.53 of Part I); Wanchoo (Recommendation No. 178 of Part 1 and Recommendation No. 183 of Part II); Sikri (Recommendation No. 192 of Part II)

The Kunzru Committee emphasized the importance of providing speed recorders along with speedometer as a means to deter drivers from over-speeding for fear of detection. The Committee recommended that speed-recorders be provided on Mail/Express trains and speedometers on remaining passenger trains "within a period of 2 years from now. It was suggested that engines of fast goods trains be also provided with speedometers. (Para No. 5.10.1 of RSRC, 1998 (Khanna Committee))

The Wanchoo Committee was critical of the progress made on this front and urged the Railways to make determined efforts to indigenously manufacture more suitable and reliable type of speedometers-cum speed recorders. (Para No. 5.10.2 of RSRC, 1998 (Khanna Committee))

The Sikri Committee noted with concern that "considering that the speedometer problem has been with the Railways for nearly 2 decades, we feel that there has been a lack of determined effort to develop a suitable speedometer/speed recorder indigenously." This recommendation was treated as Implemented in 1989, on the grounds that "supplies (of speedometers-cum-speed recorders) against the development order placed on M/s. Autometers had started."

(Para No. 5.10.3 of RSRC, 1998 (Khanna Committee))

Almost four decades after the provision of speed recorders was insisted upon by the Kunzru Committee, there are still huge gaps in the Railways' compliance on this issue in spite of the fact that there are now two Indigenous sources. To give but one example, our Committee learnt that out of the 74 locos homed in Siliguri (MG) Diesel Shed, of which 53 are nominated for passenger services, only 3 locos have been provided with speed recorders.

In Lumding (MG) Diesel Shed, not a single loco in a holding of 55 locos has this provision. It is apparent that the Railways are still to provide this basic device on a large number of locomotives. Our Committee feels that the Railway administration should provide this facility on all locomotives without further delay. (Para No. 5.10.4 of RSRC, 1998 (Khanna Committee))

Coaching Maintenance Facilities

Reference: Wanchoo (Recommendation No. 204 of Part II); Sikri (Recommendation No. 138 of Part 1, Recommendation No. 211 of Part II)

The Wanchoo Committee had underlined the importance of ensuring the provision of adequate number of washing lines and pit lines with the necessary facilities so that rakes are properly examined before their run. The Committee observed in the course of their inspections that the facilities for primary and secondary maintenance of rakes were not adequate. Some problems highlighted were shortage of pit lines, deficient drainage and poor illumination in the examination pits.

(Para No. 5.11.1 of RSRC, 1998 (Khanna Committee))

There was no substantive improvement in the position even 10 years later when the Sikri Committee reassessed the situation. The Sikri Committee made a pointed observation that the gap between the requirement and availability of maintenance facilities was widening. The Committee found that at a large number of stations the coaching rakes were not placed on the pit lines due to shortage of examination pits. Then there were problems of pits of Inadequate length, unsatisfactory lighting and poor drainage. (Para No. 5.11.2 of RSRC, 1998 (Khanna Committee))

Even 20 years later, these basic facilities for ensuring proper attention to coaching trains are far from satisfactory. We have indicated our views on the subject in Chapter II and at this point would only reiterate that coaching maintenance facilities be provided in accordance with the prescribed norms on an emergent basis.

(Para No. 5.11.3 of RSRC, 1998 (Khanna Committee))

Neutral Control Organization

Reference: Kunzru (Recommendation Nos. 143, 144, 145 of Part II), Wanchoo (Recommendation Nos. 233 & 234 of Part 11); Sikri (Recommendation No. 137 of Part-1)

The Kunzru Committee lauded the positive role played by the Neutral Control Organization in ensuring the quality of work done in the workshops and sick lines. The Committee commented adversely on the high percentage of rolling stock that were rejected by the NCO which was "an ominous pointer to the unsatisfactory work done in the workshops." The Committee also recommended that the system of neutral control examination, which was effective in exercising a check on maintenance of rolling stock be extended to cover a greater number of workshops and sick lines. (Para No. 5.12.1 of RSRC, 1998 (Khanna Committee))

The Wanchoo Committee was emphatic that the neutral control organization served the very useful purpose of keeping rolling stock in

good fettle and stressed the need to ensure that "nothing is done to weaken it in view of its independent character."

(Para No. 5.12.2 of RSRC, 1998 (Khanna Committee))

The Sikri Committee was sharply critical of Railways for turning out rolling stock without certification by neutral TXR at the nominated NTXR points. The Committee also underlined the importance of ensuring that rolling stock was turned out from workshops and sick lines after completion of al stipulated repairs.

(Para No. 5.12.3 of RSRC, 1998 (Khanna Committee))

To test the degree of compliance of the earlier Committees recommendations on the subject, we made a detailed study of the IRCA Report for the quarter ending June 1998. The report has many examples of rolling stock being turned out with rejectable defects. A simple statistic brings out the state of affairs. In the quarter April-June 1998 reviewed, out of 5747 coaches turned out by the nominated workshop subjected to NTXR check, as many as 2158 coaches with rejectable "defects having safety implications" were "ca passed by the workshop authorities overruling the objections of the NTXR. The recommendations of the earlier Committees regarding attention to deficiencies pointed out by NCO remain substantially unimplemented. Our committee has given detailed comments on this subject in Chapter III.

(Para No. 5.12.4 of RSRC, 1998 (Khanna Committee))

Delay in Recruitment through Railway Recruitment Boards

Reference: Kunzru (Recommendations 48 & 49 of Part II), Wanchoo (Recommendation 120 of Part I), Sikri (Recommendation 21 of Part II)

The Kunzru Committee had referred to persistent shortages in several categories of staff due to the delays inherent in the procedure of recruitment through the Railway Service Commissions (RSCs) now called Railway Recruitment Boards. In this connection the Committee made certain suggestions for streamlining the working of RSCS. In response, the Railway Ministry prescribed a time schedule from the date of receipt of an indent by an RSC until finalization, which was 5 months

in the case of technical categories, 7 months for non-technical categories and 75 days in the case of probationary ASMS.

(Para No. 5.13.1 of RSRC, 1998 (Khanna Committee))

The Wanchoo Committee observed that the time limits prescribed by the Railway Board for finalization of selections by the RSCS, had often been exceeded. (Para No. 5.13.2 of RSRC, 1998 (Khanna Committee))

The Sikri Committee was also critical of the inordinate delays in finalizing selections through the RSCs and recommended streamlining the recruitment procedure "so as to make available candidates as soon as vacancies arise. This recommendation was treated as implemented on the basis of the following general statement furnished by the Railway administration: "The time lag between arising of a vacancy and actual recruitment against the vacancy was being reduced at that time."

(Para No. 5.13.3 of RSRC, 1998 (Khanna Committee))

Our analysis shows that hardly any dent has been made in reducing the delays in finalizing selections through the RRBs (earlier RSCs) as evident from the information furnished by some RRBs which is reproduced below:

RRB'S Name	Category/ Post	Year of Indent	Date of Indent	Date of sub-mission of Panel
Mumbai	Prob. ASM	1994	30.6.94	23.1.96
			07.4.94	23.1.96
	App Asst Driver (DSL/ Elec.)	1994	11.7.94	22.5.96
			15.6.94	22.5.96
			09.3.95	06.2.96
	Prob. ASM	1995	28.11.95	10.7.97
			02.8.95	10.7.97
Bangalore	ASM		16.10.95	05.12.96
	DSL Asstt.		10.4.96	24.6.97
	ASM		16.8.96	20.8.97
Guwahati	Appr JE(Sig) Gr II	1996	18.1.96	3.3.98
	Appr SI/Gr. II	1996	18.1.96	26.3.98
	Appr. CTXR	1996	18.1.96	26.3.98
	Appr. TXR	1996	18.1.96	26.3.98

	ASM	1996	05.9.96	09.1.98
Chandigarh	ASM	1996-97	25.7.95	25.9.96
	Asst. Driver (DSL/Elec)	1997-98	01.6.93	08.8.97
Ahmedabad	App. Asstt. Driver (DSL/Elec)	1994-95	22.3.94	2/3.8.95
	Prob. ASM	1995-96	07.9.95	08.3.97
Patna	Tr. Asst. Driver Elec.	1995-96	13.11.95	26.12.97
	Asstt. Driver DSL	1996-97	22.8.96	11.7.97
	Tr. ASM	1996-97	04.11.96	11.7.97
	Asst. Driver	1996-97	04.11.96	11.7.97
	Tr. ASM	1996-97	02.1.97	22.9.97
Malda	Tr Asst. Driver (Elec.)	1996-97	13.11.95	05.2.98
	Tr. Asst. Driver	1997-98	22.08.96	Written Test held on 22.3.98. Result suspended

(Para No. 5.13.4 of RSRC, 1998 (Khanna Committee))

Psycho-Technical Cell and Psycho-technical Research

Reference: Kunzru (Recommendation 36 of Part I); Wanchoo (Recommendations 129, 130 of Part 1, Recommendation 44 of Part II); Sikri (Recommendations 46 47 Part 1, Recommendation 20 of Part II)

The Kunzru Committee had first mooted the idea of applying psychotechnical tests to a limited number of drivers, cabinmen and levermen before selection to these posts. In pursuance of this recommendation, the Railways set up a psycho-technical cell which conducted job analysis with a view to standardizing tests for a few select categories of staff. (Para No. 5.14.1 of RSRC, 1998 (Khanna Committee))

The Wanchoo Committee, while endorsing the value of psycho-testing as a means to promote safety in train operation, felt that the application of tests in selection of personnel should be expedited by the Railways.

The Committee also recommended that the scope of the cell be enlarged "to encompass the broader problems of socio-psychological make-up of the railway worker and of human engineering." By 1972 the test batteries had been developed and applied to some key categories of staff both at the stage of initial recruitment and also in service".

(Para No. 5.14.2 of RSRC, 1998 (Khanna Committee))

The Sikri Committee was of the view that not much progress had been made in enlarging the scope of activities of the psycho-technical cell in the area of labour-science research. The Committee stressed the importance of bringing within the purview of the psycho-technical testing those Class IV staff who, by promotion, would occupy jobs that have a vital bearing on safety. The Committee further urged the Railway administration to strengthen the Psycho-Technical Cell by improving the promotional prospects of the officials manning the Cell.

(Para No. 5.14.3 of RSRC, 1998 (Khanna Committee))

Although psycho-technology has made rapid advances and is today recognized as a key ingredient of human engineering in the work place, and an invaluable diagnostic aid for identifying aberrations in psychological make-up and behaviour, the overall progress made in psycho-technology on IR has not been encouraging. The psycho-technical cell has conducted a few studies on problems of front-line staff, particularly drivers. The impact of psycho- technology has so far been only marginal. In Chapter-II we have indicated some of the shortcomings in the existing set-up. Our committee is of the view that the top management of the Railways will need to devote much greater attention than hitherto, to make the psycho-technical cell a truly professional outfit that is capable of finding solutions to the psychological and human behaviour problems on IR.

(Para No. 5.14.4 of RSRC, 1998 (Khanna Committee))

Running Rooms

Reference: Kunzru (Recommendation No.81 of Part II), Wanchoo (Recommendation No. 78 of Part II), Sikri (Recommendation No. 58 of Part II)

Recognizing the critical role of the driver in ensuring safety, the Kunzru Committee had stressed the importance of setting up suitable running rooms and "early completion of standard facilities in all of them." This recommendation was treated as implemented on the grounds that "the Railways have generally provided essential facilities." The Railway administration avoided commenting upon provision of "standard" facilities in the running rooms.

(Para No. 5.15.1 of RSRC, 1998 (Khanna Committee))

The Wanchoo Committee was also of the view that much needed to be done to make the running rooms adequately comfortable. The Committee felt that the prescribed yardsticks for provision of amenities in running rooms-

> *"Should be rigidly applied in order to ensure that adequate facilities are available for the comfort of the running staff."*
>
> (Para No. 5.15.2 of RSRC, 1998 (Khanna Committee))

The need to provide the right kind of environment for the running staff to take rest at outstations also engaged the attention of the Sikri Committee, which was very specific about the facilities to be provided in the running rooms. Apart from recommending individual cubicles, the Committee called upon the Railway administration to provide basic necessities ties like clean linen, mosquito nets, adequate water supply, improved sanitary conditions This recommendation was treated as implemented on the basis of various instructions issued by the Railway Board on the subject.

(Para No. 5.15.3 of RSRC, 1998 (Khanna Committee))

We have already referred to the state of the running rooms in Chapter 11. We would urge the Railway administration to make the improvement of running rooms a corporate mission.

(Para No. 5.15.4 of RSRC, 1998 (Khanna Committee))

Duty Hours of Crew

Reference: Kunzru (Recommendation No.42 of Part I); Wanchoo (Recommendation No. 119 of Part I); Sikri (Recommendation No.64 of Part I)

A constant and persistent source of friction between Railway management and labour has been disagreement on duty hours for the running staff. While most categories of Railway staff were covered by the Hours of Employment Regulations, 1931, running staff were initially kept out of its purview apparently due to operational considerations and the open-ended nature of their duties. It was only in 1951 that running staff were brought under the HOER as a result of the recommendation made in the Adjudication Award given by Justice Rajadhyaksha, who placed a limit on the "running duty" but excluded the pre-departure and post-arrival detentions. Thereafter, the Railway management has been progressively reducing the rostered duty hours of running staff.

(Para No. 5.16.1 of RSRC, 1998 (Khanna Committee))

The Kunzru Committee expressed concern that in many cases the actual duty hours of goods train drivers exceeded the rostered hours and desired that the Railways take steps to improve the situation. The Wanchoo Committee was also critical of the Railways' failure to make sufficient headway in keeping the duty hours of running staff within the prescribed limit. Although this recommendation on duty hours of running staff was treated as implemented, the actual situation on the ground provoked the Sikri Committee to state that the recommendation still remained to be implemented. The Sikri Committee further stated that it was "unfortunate that in a matter that has a direct bearing on safety the action taken so far has been tardy. (Para No. 5.16.2 of RSRC, 1998 (Khanna Committee))

According to the extant instructions, the overall duty at a stretch of running staff from "signing on" should not ordinarily exceed 12 hours. Indicating the present status of implementation of the recommendation on duty hours of running staff, the Railway Board has stated that in the period January to June 1998, "the overall duty is being completed within 12 hours from "signing on" on all the Railways except Southern and South Eastern Railways who have been advised to improve the position" However, the position furnished by the Zonal Railways to the Committee is as under:

Incidence of longer hours on duty of Drivers 'C' for the year 1997-98 railway-wise

Railway	Total No. of Trips by Drivers 'C'	No. of trips between 10-12 hrs overall duty	No. of trips between 12-14 hrs overall duty	No. of trips between 14-16 hrs overall duty	No. of trips over 16 hrs overall duty
CR	118288	15125	6483	2271	0
ER	160345	149952	6837	3556	0
NR	281139	261029	11000	4720	4390
NE	22637	2478	2289	1145	381
NF	46104	10382	3037	1742	0
SR	108001	16376	6970	17521	0
SC	216585	26409	11652	26002	0
SE	353703	58644	26391	47345	23673
WR	168929	23919	16493	9745	302
TOTAL	**1475731**	**564314**	**91152**	**114047**	**28746**
Percentage	**100.0**	**38.2**	**6.18**	**7.73**	**1.95**

(Para No. 5.16.3 of RSRC, 1998 (Khanna Committee))

Our committee is of the view that the Railways should make greater efforts to reduce the incidence of longer hours on duty of running staff. This subject will be taken up in detail in the Final Report. (Para No. 5.16.4 of RSRC, 1998 (Khanna Committee))

Status of Divisional Safety Officer and Tenure in Safety Organization

Reference: Wanchoo (Recommendation No 331 of Part II); Sikri (Recommendation Nos 243 & 245 of Part II)

The Wanchoo Committee had expressed itself strongly in favour of having the post of DSO in the same grade as other divisional officers so that the DSO was able, by virtue of his status, to "carry weight with his

counterparts in the other departments This recommendation was reiterated by the Sikri Committee which felt that the relatively junior status of the DSO compared to his colleagues in the other disciplines was a major handicap as he was not able to impose any kind of discipline on the other departments even on issues directly linked to safety. The Sikri Committee was also in favour of a minimum of 2 years' tenure for persons posted to the Safety organization.

(Para No. 5.17.1 of RSRC, 1998 (Khanna Committee))

Our committee finds that these two recommendations remain substantially unimplemented by the Railways. There are as many as 39 divisions on the Indian Railways where the DSO is in Senior Scale whereas the other branch officers are in the Junior Administrative grade. And judging by the actual position on the ground, it would appear that the Railways have altogether forgotten about ensuring a minimum tenure of 2 years for persons posted to the safety organization. To cite a few examples, the post of Chief Safety Officer of South-Central Railway has had 20 incumbents in the period 1988-89 to 1997-98, on the Northern Railway 17 incumbents and an equal number on the North-Eastern Railway during the same 10-year period.

(Para No. 5.17.2 of RSRC, 1998 (Khanna Committee))

We have indicated our recommendations on the subject in Chapter III. (Para No. 5.17.3 of RSRC, 1998 (Khanna Committee))

Delay in Finalization of Accident Enquiries & Disciplinary Action

Reference: Kunzru (Recommendation No. 49 of Part 1, Recommendation No. 65 of Part II); Wanchoo (Recommendation No. 133 of Part 1); Sikri (Recommendation No.40 of Part I)

The Kunzru Committee had expressed itself strongly in favour of prompt punishment of railway staff who were guilty of lapses leading to accidents. The Committee felt that punishment must inevitably be meted out for an unsafe act or breach of rule, but the Committee warned that if punishments were delayed, the deterrent effect was lost. The Committee

urged the Railways to conform to the targets laid down for finalizing accident cases and disciplinary action thereon.

(Para No. 5.18.1 of RSRC, 1998 (Khanna Committee))

The Wanchoo Committee found that the time taken for finalization of accident cases was far beyond the target prescribed. Ten years later, the Sikri Committee passed the verdict that this recommendation remained substantially 124 unimplemented as time taken by the Railways for finalization of accident cases exceeded in all cases the target laid down by the Railway Board. (Para No. 5.18.2 of RSRC, 1998 (Khanna Committee))

Though there has been a substantial improvement in the position since then, as seen in the figures given below, there is still considerable scope to effect improvement.

Year	No. of accidents	No. of cases in which inquiry has been completed including award of punishment within D+90 days	No. of staff held responsible	No. of staff finally awarded punishments	No. of enquiries pending finalization beyond D + 120 days
1993-94	674	344	912	879	49
1994-95	604	233	787	734	70
1995-96	440	210	537	508	64
1996-97	426	205	540	483	52
1997-98	420	198	582	467	66

(Para No. 5.18.3 of RSRC, 1998 (Khanna Committee))

Conclusion

In retrospect, we have traced the trajectory of the important topical recommendations made by the three earlier Committees and examined the nature of the Railways commitment to implement the accepted recommendations. The conclusion we draw is that there is scope for better implementation of the accepted recommendations of the various Committees. While it is acknowledged that constraint of funds has been a hindrance, our committee has identified a number of frailties in the Railway management's response to the earlier Reports, not with the

purpose of fault finding but to help reorient the entire corporate approach so that more productive results are achieved in the future.

(Para No. 5.19.1 of RSRC, 1998 (Khanna Committee))

Our committee is convinced that an essential prerequisite for ensuring that key safety issues remain an integral, critical part of the corporate vision is to set up a proper monitoring mechanism to oversee the compliance of the recommendations made by various Committees on rail safety and the very first recommendation has been given in Chapter II to that effect. (Para No. 5.19.2 of RSRC, 1998 (Khanna Committee))

The complete recommendations of the Sikri Committee juxtaposed with remarks furnished by the Ministry of Railways regarding implementation are given in Appendix A.

(Para No. 5.19.3 of RSRC, 1998 (Khanna Committee))

REPORT OF THE RAILWAY SAFETY REVIEW COMMITTEE, 1998

(SHRI H. R. KHANNA, 1998)



REPORT
OF
THE RAILWAY SAFETY REVIEW COMMITTEE, 1998

PART-I

August,1999

Executive Summary

Indian Railways (IR), India's oldest and largest industrial undertaking, is at the crossroads. A major propellant of the country's economic growth, it has consistently shown a financial surplus and used its assets more efficiently than even the most advanced railway systems. But in the wake of a series of rail tragedies, IR's credibility is at an all-time low. The latest horrendous accident at Gaisal has shaken the faith of the common man in the reliability of the Railways. Much needs to be done to restore that faith.

Our committee's investigation of IR's safety regime reveals that this is an area that needs immediate resuscitation and sustained corporate attention. The general erosion of work ethics and standards of discipline in the country has seeped into IR which continues as an essentially labour-intensive Organization without the benefit of expensive safety systems commonly used by most World Railways. Technology progression, so vital for safety and for facing the challenges posed in the fierce competitive ambience triggered by globalization, has been erratic, unfocussed, and halting. And perhaps most disquieting of all, is the general state of disrepair of the essential infrastructure and assets of the railways. The extent of the problem can be gauged from the fact that IR's present inventory of overaged assets transmuted into money terms is a whopping Rs. 15,000 crores. It is apparent that the spectacular Increases in passenger and freight output over the years have been achieved by "overstressing" assets and reducing safety margins. Against this backdrop, **our committee has underlined the need for IR to focus on consolidation and upgradation of essential infrastructure rather than on network expansion and populist but financially ruinous railways so that arrears in the renewal of vital safety equipment are wiped out within a fixed timeframe.**

Our committee believes that human beings are IR's most valuable asset and the key determinant of safety. And also, the most vulnerable, Judging by IR's safety record. **We have recommended enhancement in the educational cut-offs for recruitment/promotion to the safety categories; a revamp of the Railway Recruitment Boards and the system of psycho-testing; improvements in training methods.** With kaleidoscopic changes in technology, **appropriate institutional structures have been recommended to ensure that staff skills keep pace with upgradation of technology.** We have also studied issues relating to the structure of the hierarchy, the chain of command and the role of unions. **We have stressed the need to bar supervisors from joining unions, suggested simplification of the procedures associated with transfer of union officials, and also given recommendations for empowerment of supervisors.**

Our committee is unanimous that the most vital element to be factored into the safety strategy of the railways is the driver. We find that except for monetary emoluments, other important aspects such as his training, working conditions, job environment have been neglected. In this connection, we have recommended **provision of certain basic facilities in running rooms, improvement of uniforms, training on simulators, timely refresher training, monitoring and prompt rectification of defects noticed by the driver.**

Our committee believes that induction of the appropriate technologies should form a crucial plank in the safety strategy of IR as they will not only enhance safety but also increase productivity and eventually improve financial viability. However, keeping in view the financial resource crunch of the railways, we have carefully prioritized our recommendations. **We have identified Train Radio Communication facility, Train Protection and Warning System, and Track Circuiting in the top rung of technical aids to be inducted by IR on high**

priority. Among other technical devices recommended for adoption are the Train Actuated Warning Device for level crossings and Block Proving by Axle Counters. We have also given suggestions regarding flasher lights and other emergency provisions in locomotives.

A particularly unhealthy feature has been the less than satisfactory maintenance of assets. The infrastructure for maintenance of rolling stock and track is Inadequate and there are problems of shortage of material and sub- standard material. Our committee **has recommended that the railways undertake an immediate survey of the inadequacies for rolling stock maintenance and make good the shortcomings.** A detailed analysis has been done of the problem of rail/weld failures on the basis of which we have **recommended immediate implementation of the "need based" concept of USFD testing, acquisition of a modern recording car along the lines of German Railways, procurement of the latest technology of Thermit welding, setting up of a welding school.**

Over the decades some self-inflicted and organizationally damaging practices have crept into the railway system. We have addressed the extremely serious problem of manipulation of accident and safety related statistics. **Our committee has recommended that the act of suppression of an accident should be viewed to be as grave an offence as being responsible for causing an accident.** We have also commented on the staggering scale of ceremonial, inaugural and celebratory functions on which an unacceptable amount of time and money is being spent by the railways. We have recommended **that as a mark of respect for the dead and injured in various accidents, there should be a complete three-year moratorium on all types of celebratory and ceremonial functions.**

An issue that is very adversely affecting the safety environment is "departmentalism" on the railways. We have **recommended that**

a Management Consultancy of international repute be engaged to study this issue in depth.

Another area of weakness identified by our committee is the general, all-round decline in the quality of inspections. In this context, we have **suggested scrupulous checking of rectification of shortcomings noticed in earlier inspections, special Safety Audits. We have also advanced the proposition that the number of inspections to be conducted by an individual should be inversely proportionate to his position in the hierarchy.**

In the ultimate analysis, our committee has found that IR has all the answers to the problems of safety, but it is in the implementation and execution of that knowledge that the railways fall short. It is for this reason that our committee's first recommendation relates to **setting up monitoring mechanisms at various levels on the railways for overseeing the implementation of the recommendations of Railway Accident Inquiry Committees.** We were also struck by the fact that there is nothing like a safety policy document on the railways spelling out the safety objectives, projects, and strategies for implementing them. We have recommended **that railways make out a comprehensive corporate safety plan which shall spell out the priorities for investments on safety-related works and also indicate a timeframe for completion of such works.**

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INTRODUCTORY

(CHAPTER: I / THE RAILWAY SAFETY REVIEW COMMITTEE, 1998: H. R. KHANNA COMMITTEE REPORT 1998)

1

1.0 Introduction

1.1 Our Committee, which is entrusted with the task of investigating the entire gamut of safety on Indian Railways (IR), has been set up at a critical moment in the history of the Railways. There has never been an age so richly endowed with knowledge, technology, and human skills, a combination capable of transcending almost any impediment to progress. On the face of it, Indian Railways (IR) which has consistently shown a financial surplus and has been using its assets more efficiently than even advanced Railway systems, should be able to face the future full of confidence. And yet, the curious paradoxical situation today is that, in the public perception, it's credibility as a safe mode of transport is quite low. As India's most visible industry, the Indian Railways (IR) is a central concern of all segments of our society. Public disquiet in the wake of train disasters was at the heart of the Government's decision to conduct an

independent investigation of safety on Indian Railways. At the same time, the appointment of this Committee was also an acknowledgement that although the Railways has the expertise and technological capacity to work out its own solutions for providing an adequately safe system, the time was ripe for another external and dispassionate assessment of its safety regime.

1.1.1 Independent, high-powered Committees to investigate Railway safety such as ours, have historically been set up in troubled times for IR. Since independence, three high-level Committees have been constituted to examine various facets of safety on Indian Railways. The first Committee, viz. the Kunzru Committee was set up in 1962, followed by the Wanchoo Committee in 1968 and the Sikri Committee in 1978. Each of these Committees had been set up in response to grave public concern following major rail disasters, when the Government decided that the entire safety system needed to be examined in depth. The raison de'tre for the setting up of our committee after a gap of twenty years was no different.

1.1.2 The first indication of the Government's intent to set up another high- powered Committee to investigate safety on Indian Railways was the mention of the proposal in the Status Paper issued by the Ministry of Railways in May, 1998 It was stated therein that "a high-powered Committee, on the lines of the earlier Kunzru and Wanchoo Committees, is also being set up to study the problem (of safety) as it exists today in

depth and make recommendations." On 30 August 1998, the Government set up this Committee vide Ministry of Railways notification No. ERB-1/97/23/39, which is reproduced below: -

Resolution

In view of the concern voiced by various sections of Indian society in regard to train accidents and the public concern expressed regarding the safety performance of Indian Railways, Ministry of Railways (Railway Board) have decided to set up a High-Power Railway Safety Review Committee to go into all aspects connected with the safe running of train services in the country The constitution of the Committee will be as follows:

	S/Shri	
1.	Justice H. R. Khanna, Retired Judge of the Supreme Court	Chairman
2.	V. Dhananjaya Kumar, Member of Parliament (Lok Sabha)	Member
3	Ananta Sethi, Member of Parliament (Rajya Sabha	Member
4.	CL Kaw, Retd. Chairman, Railway Board	Member
5	LK. Sinha, Retd. Member Mechanical, Railway Board	Member
6	S.M. Vaish, Retd. General Manager, Northern Railway	Member
7	V. S. Dutta, Commissioner of Railway Safety, Northern Circle	Member
8	Dr. Vinod Chandra, Professor, Deptt. of Elec. Engg, ITT, Delhi	Member

1. One Senior Administrative Grade Officer will be appointed as Secretary of the Committee
2. The terms of reference of the Committee will be as under.

(e) To review the position of accidents on the Indian Railways since the appointment of the Railway Accidents Inquiry Committee, 1968 and to review the implementation of the recommendations of all previous Accident Inquiry Committees.

(f) To examine the adequacy of the existing organization, equipments and practices for ensuring safe running of trains on Indian Railways and to suggest measures for prevention of accidents,

(g) Implications of financial investment planning of Railway projects on safety; and

(h) To examine safety measures/equipments/technology as adopted by Railways of some of the advanced countries which would have relevance for Indian Railways and could also be adopted for use on Indian Railways.

1. The Committee will be required to submit the report within six months from the date of its constitution.

Sd/-
D.P TRIPATHI
SECRETARY, RAILWAY BOARD AND
EX-OFFICIO ADDITIONAL SECRETARY
TO THE GOVERNMENT OF INDIA

(On account of the dissolution of the 12th Lok Sabha, the Committee was deprived of the services of Shri V. Dhananjaya Kumar from 26.4.1999 The Committee acknowledges with gratitude his immense contribution in the framing of this Report.)

1.1.3 The present Railway Safety Review Committee has been given much wider and more comprehensive terms of reference than any of the earlier Committees. This Committee is required to review the implementation of recommendations of all the three earlier Accident Enquiry Committees, whereas the earlier Committees' task was limited to undertaking a

study of the recommendations of the Committee that immediately preceded it. Moreover, certain altogether new elements have been added to the terms of reference, viz the implication of financial investment planning on safety as also the examination of safety measures and technology used by Railways of some advanced countries which could be adopted for use on Indian Railways. In consideration of the voluminous nature of the work, the tenure of the Committee, which was initially only six months from its constitution in August 1998, was extended by a year up to February 2000. In view of the enormity of the task assigned to it, the Committee has serious doubts whether it will be able to submit its final report even within the extended time frame.

1.2 Scope of Report

1.2.1 In the first part of our Report, we have covered term of reference (a) relating to review of the position of accidents on the Indian Railways since the appointment of the Railway Accidents Inquiry Committee, 1968 (subsequently amended by the Government to a review of accidents from 1988-89 to 1997-98 due to non-availability of data) and review the implementation of the recommendations of all previous Accident Inquiry Committees, and also partly term of reference (b) dealing with, "examining the adequacy of the existing organization, equipments and practices for ensuring safe running of trains on Indian Railways and to suggest measures for prevention of accidents". We have also made some recommendations concerning terms of reference (c) and (d). Our subsequent report will deal with other

remaining issues pertaining to term of reference (b) and also comprehensively cover the terms of reference (c) and (d) relating to, "implication of financial investment planning of Railway projects on safety" and "examining safety measures/ equipments/ technology as adopted by Railways of some of the advanced countries which would have relevance for Indian Railways and could also be adopted for use on Indian Railways"

1.3 Our Approach

1.3.1 Our committee is acutely conscious that, given the Railways hoary and rich tradition, there is hardly any area concerning safety that is not already a well-trodden path, more so because the Railways has been subjected to microscopic scrutiny by three earlier Committees. We were, time and again, reminded that there is really nothing that the Railwaymen do not know about safety. Seen in this light, our investigation of safety on Indian Railways has not been a voyage of discovery into an arcane, mysterious world, but essentially, not completely, a dredging mission to retrieve healthy concepts and practices that, for various reasons, have either been Jettisoned, or delayed or ever implemented in the first place. We are also alive to the fact that in the kaleidoscopic world of today, safety issues and concerns will be moulded by bewilderingly rapid technological change, and this knowledge has also determined the trajectory of our Report.

1.3.2 It is important that our recommendations are practical. The challenge before our committee was to weigh safety concerns in the light of present knowledge and

future needs. Although the Committee has benefited immensely from a study of the reports of earlier Committees, we have adopted a slightly different approach to our task. First of all, our report is structured differently While the reports of the past Committees have followed the conventional route of dealing issues department wise in separate chapters, our Committee has made a departure and dealt with safety related issues based on their significance We have, to an extent, dispensed with total compartmentalization and instead graded issues and consequently our recommendations on the basis of their importance to safety. In Chapter II we have focussed on the most vital concerns regarding safety and made our recommendations thereon. In Chapter III we have dealt with the other specific issues pertaining to safety, department wise, but here again we have attempted to priorities our recommendations according to their significance In Chapters IV and V we have respectively analyzed the statistical data relating to accidents and safety, and reviewed the implementation of the recommendations of the earlier Committees by the Indian Railways

1.3.3 Another difference in the approach adopted by our committee compared with the earlier Committees is that, in making recommendations with major financial implications, we have attempted, wherever feasible, to give an approximation of the funds required We have also indicated what we consider to be a reasonable timeframe for implementation of such recommendations, keeping in view the financial capability of the Railways.

1.3.4 Our approach in dealing with the various issues pertaining to safety on Indian Railways is to present the unvarnished picture, without covering up the blemishes in the system. This has inevitably involved some harsh observations about the practices on the Railways, which stem from a deep and genuine concern for safety We do hope that this criticism is accepted in the right spirit and provokes a positive and quick response from the Railway management. The dominant refrain in our Report is that the Indian Railways has all the answers to the problems of safety, but it is in the implementation and execution of that knowledge that the Railways come up short.

1.4 Methodology

1.3.5 The Committee adopted a multi-faceted approach to the task assigned to it. Soon after the Committee was set up, a notification was issued in all the leading dailies in the country calling for suggestions on rail safety from the public, technical institutions, chambers of industry, etc. The notification was repeated in the newspapers after every 3/4 months and elicited a very good response not only from the public and institutions within the country but from organizations dealing with rail safety in countries abroad. The Committee circulated detailed proformae to the Zonal Railways for filling up statistics covering various facets of accidents so as to be able to make a meaningful analysis of the trend of accidents on IR. Information was also obtained from the Ministry of Railways regarding the extent of follow-up action taken by the Railways to implement the accepted recommendations of the three earlier Accident Inquiry

Committees, the basis on which recommendations were treated as implemented and the reasons for non-Implementation of certain recommendations. The Committee checked the ground realities regarding implementation on random basis.

1.3.6 An important component of the study of the safety environment on IR has the detailed questionnaires that were drafted by this Committee and Circulated to the Zonal Railways, the RDSO, Production Units, RRBs, ZTCs and the Railway Unions.

1.3.7 Apart from such data collection, the Committee held discussions with a cross-section of railwaymen from the top management in the Railway Board and Zonal Railways to the ordinary workers and representatives of the Railway Unions. The Committee invited retired railwaymen as also rail users to give evidence on issues relating to rail safety. There were extensive field trips to investigate the conditions on the ground. Making use of the information boom available in the IT age, a lot of useful information on the railways in advanced countries was downloaded from the Internet. The Committee also had an opportunity to visit some of the advanced countries to observe safety practices and technology used in those systems, firsthand. However, while views, perspectives and observations have been culled from numerous sources, the conclusions are those of the Committee.

1.5 Decision to submit Part-I of the Report

1.5.1 Even as the committee was getting into its stride and mapping out the many areas of safety to be covered, the entire nation was jolted by the nightmarish rail disaster involving a derailed part of the Golden Temple Mail

and the Sealdah Express near Khanna in Punjab on 26.11 98 in which 212 passengers lost their lives and 138 were injured. Railways was taken to task by the media which painted this vast organization as "a virtual hell on wheels". The fact that the Government had set up this high-powered committee to investigate safety on the railways was considered as a positive indication of the Government's determination to improve matters. The committee members were of the view that a great deal needed to be done, and done quickly, to improve the safety of the environment. It was, therefore, decided that instead of a single report, the committee should submit its findings in two parts, the first by August 1999, with a second final report in the meantime, the Government also suggested submission of an interim report by August 1999.

1.5.2 After we had finalised this report, the horrendous head-on collision between Brahmaputra Mall and Awadh-Assam Express occurred at Gaisal in West Bengal resulting in the death of nearly 300 persons and injuries to more than 300. This gruesome tragedy has further highlighted the need and urgency for ensuring a high level of safety on IR.

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SAFETY ENVIRONMENT -
THE KEY ISSUES
(CHAPTER: II / THE RAILWAY SAFETY REVIEW COMMITTEE, 1998: H. R. KHANNA COMMITTEE REPORT 1998)

2

2.0 Safety Environment – The Key Issues

2.1 The Safety Challenge

2.1.1 During the colonial period, the Railways was conceived and operated as an auxiliary wing of the Army, primarily because it provided the transport muscle that enabled rapid movement of troops across the Indian sub-continent. There was, however, another less visible but important reason for the close linkage with the Army. The colonizers realized that the Railways, by virtue of its complex nature, required a high degree of discipline and efficiency to be able to perform its role as the prime transport mode. This, in turn, meant a system of working more closely allied to the Armed Forces than the sometimes-lax civilian forms. Thus, historically, Indian Railways (IR) has functioned differently from other Government institutions.

2.1.2 IR is quite unique and distinctive in character, really a microcosm of India. To make it a safe and reliable system is an enormous challenge. The Railways has the most intricate and involved inter-dependencies. Safety on the Railways is the end product of the cohesive fusion of its myriad parts - human beings, permanent way, rolling stock, signalling and even the public which is more blatantly obtrusive on the Railways than in any other transport mode. A single flaw in the 62,495 route kms of track that crisscross the country, a defect in the 7,500 locos, 40,000 coaches and 2.5 lakh wagons that haul more than 11 million passengers and over 1.2 million tonnes of freight every day, an incorrect Indication on one of the thousands of signals that dot the rail landscape, a mistake or an act of negligence by one of its 6,00,000 frontline staff directly associated with train running, even a rash act by one of the millions of road users who daily negotiate the 40,000 odd level crossing gates spread across the system. An irresponsible act of carrying inflammable goods any one of these million possibilities has the potential to cause a major tragedy. Added to these are the acts of sabotage by misguided elements spanning the whole country. Our committee is aware of that given the awesome challenge faced by Railways. **It is not only unrealistic but also dangerous to treat the Railways and its problems on par with other Government departments which has unfortunately been the case during the last five decades.** Our investigations, and the views of numerous railwaymen, past and present, point to a

steady and general erosion in the work ethics and standards of discipline at all levels on the Railways. We are convinced that if the Railways is to effectively perform its ordained role as the prime transport mode and propellant of economic growth, **it will need to be insulated from some of the conventional norms that typify governmental functioning.** Our approach to the subject of safety on IR has been deeply influenced by this concern, especially in relation to organizational and labour management issues.

2.1.3 Another crucial aspect of the functioning of the Railways that has determined our thinking on railway **safety is the general state of disrepair of the essential infrastructure and assets of the Railways.** A fundamental dictum of safety is thorough and timely maintenance and renewal of key railway equipment and infrastructure. The Committee has observed that the Railways is saddled with a huge inventory of overaged, decaying assets, a problem that becomes almost intractable when linked with the unhealthy state of Railway finances. In our Final Report we will be covering in detail the financial implications of investment planning on safety, but a matter for immediate concern **is the dwindling allocations to Depreciation Reserve Fund (DRF) over the years**, which has contributed largely to the present unhappy state of railway infrastructure and assets The appropriation to the DRF in relation to the Capital at-charge from the year 1990-91 to 1998-99 was as under:

		(Amount in Crores of Rupees)	
Year	**Capital-at-Charge**	**Appropriation to DRF**	**Percentage**
1990-91	16126	1950	12.00
1991-92	17712	2010	11.29
1992-93	20123	2300	11.44
1993-94	20874	1875	8.98
1994-95	21773	2140	9.82
1995-96	22248	1260	9.25
1996-97	2347	2115	8.98
1997-98	25320	1904	7.52
1998-99(Revised Estimate)	27322	1600	5.86

The table indicates capital-at-charge as per historic book value while the DRF appropriation is of current value. If the inflation factor is taken into account, the situation is much worse.

2.1.4 The result of this neglect to cater adequately for replacement and renewal of assets is that as on 01.4.99, the Railways' inventory of overaged assets of track, rolling stock and signalling gear transmuted into money terms amounted to a staggering Rs.15,054 crores at current costs. While this critical aspect, which directly affects safety, suffers on account of inadequate financial allocations, it has come to the Committee's notice that the Railways has been frittering away scarce resources on monumental but financially unremunerative projects. In a situation of inadequate financial resources, our committee is convinced that the **prime focus of Railways should be on consolidation and upgradation of the essential infrastructure and assets rather than on populist but financially ruinous projects. Reorientation of priorities is,**

therefore, essential in the interests of the safety of the travelling public.

2.1.5 The Committee appreciates that the Government has full freedom to take decisions on such matters but that should not be at the cost of the railways If the Government considers investment in some financially unviable project a necessity, it has to compensate railways for it as is the case in most countries of the world. The Committee has also no doubt in their mind that rehabilitation of the existing system must get overriding priority- even priority over viable projects. Only then can safety be ensured.

2.1.6 One persistent refrain of successive railway managements, when discussing their achievements, is the spectacular increase in the tonnage of traffic lifted and passengers carried without commensurate growth in the infrastructure. To quote from the Status Paper on IR published in May 1998: -

"Over the last 4 ½ decades, the Indian Railways have maintained a steady growth in both passenger and freight transport output with minimum of inputs as can be seen from the input-output matrix given below:

(1950-51 taken as 100)

Period	Passenger Kilometers	Passenger Kilometers	Coaches	Wagons	Tractive Effort LOCOS	Route Kilometers
1950-51	100	100	100	100	100	100
1996-97	468	635	229	257	201	117

This has been achieved despite severe resource constraints through a steady improvement in the productivity of assets as will be seen from the Table below:

Period	Coach Utilization (In Passenger Kilometers per 1000 seating capacity)	Wagon utilization (Net Tonne Kilometers per wagon day (BG)	Track utilization (Million Net Tonne Kilometers per route KM (BG)
1950-51	NA	710	1.50
1960-61	61.2	998	2.80
1970-71	71.2	908	3.60
1980-81	105.2	986	4.3
1990-91	119.6	1407	6.3
1996-97	128.7	1840	6.45

2.1.7 Behind this euphoria lies hidden one of the major problems confronting safety on IR. It is true that this productivity has been achieved in large measure through sheer hard work, technological and operating innovations for which the Railways has good reason to be proud and satisfied. However, the underbelly of such frenetic and single-minded pursuit of increasing volumes of passenger and goods traffic, without commensurate emphasis in terms of investment and managerial focus on core areas, ineluctably associated with safety, such as maintenance and replacement of worn-out assets, human resource development and modernization, is the widening of the gap between precept and practice. So extensive has become the unholy hiatus between the rules and the actual field conditions that today the slogan of "work to rule" is a nightmarish thought for the railway management, a threat which,

if implemented, would bring the Railways to a near standstill. The railway management has been driven to condone but also to encourage adoption of shortcut methods in its single-minded pursuit of short-term achievements. Such undue emphasis on operational performance, essentially freight loading and movement, at any cost has encouraged adoption of this approach which has resulted in conditions less safe than desirable.

2.1.8 Induction of the appropriate technology is universally accepted as an integral requirement for safety enhancement, but it is unfortunate that technology progression on IR has been painfully slow. The most scathing testimony to the lackadaisical approach on technology induction is the leisurely progress of track circuiting and the near immobility on the Auxiliary Warning System (AWS) - two devices which have become mandatory safety aids worldwide. IR has been lagging behind in harnessing the extraordinary capabilities of electronics which has already had a profound and revolutionary impact on train safety in the advanced Railway systems. This concern has also influenced the Committee's approach to its task.

2.1.9 Our Committee is of the view that our foremost task is to dismantle the myths and unveil the hidden realities about the safety environment on the IR so that the formidable challenge to make the Railways a more safe and reliable mode of transport is addressed in the right perspective There is need for enunciation of the most fundamental requirements of safety on IR We begin by focussing on the dominant themes

and key areas that impinge on safety, issues that the Committee feels are critical to the well-being of the Railways. By such highlighting and discussion of issues seminal to safety, we have been able to arrive at our important recommendations for improving the safety on IR.

2.2 Implementation of Safety Matters

2.2.1 If this Committee were to make only one recommendation it would be for IR to rigorously monitor implementation of safety items already known and languishing at various stages of consideration/execution. The most serious deficiency in safety matters is that these are inordinately delayed or insufficiently funded.

2.2.2 The Committee recommends that implementation of accepted recommendations of Railway Accident Committees should be regularly reviewed and monitored at several levels once in two months as under:

Level	By	With	Convenor	Remarks
Railway Board	CRB	Full Board	ED/Safety	CCRS to join
Zonal Railway/ RDSO	GM/DG	PHODS/EDs	CSO	CRS/CCRS to join
Department	PHOD	HODs	Nominated Head-quarter's SAG Officer	CSO to join
Division	DRM	Divisional Officers	DSO	CRS and CSO to be invited

2.2.3 These meetings should have a specific comprehensive agenda, detailed minutes of which should be submitted to the next higher level within three days for the purpose of monitoring.

2.3 Safety Projects

2.2.1 We recommend that decisions on safety projects should cover the items completely in all aspects like funding, time schedules, actions, accountability, etc. over several years.

2.4 The Human Element

2.4.1 The foundation on which the entire safety edifice rests is the human element. However advanced and sophisticated the technology adopted, it is axiomatic that the safety standards in any organization would depend ultimately on the quality of the manpower on the rolls, but this axiom applies even more forcefully on IR which is highly labour intensive in every sphere of activity, The Committee's analysis of accident statistics clearly underlines the all-pervasive influence of the human element in safety. Apart from the fact that the majority of tram accidents have been attributed to direct human failure, even those ascribed to material failures or technology breakdown can often be traced back to human failure in operation, maintenance or workmanship. In the last decade between 1988-89 and 1997-98, of the reported train accidents, the number attributed to railway staff failure, ether direct or indirect, ranged between 71 percent and 75 percent of the total, a number that clearly points to the human element as the Inchon of safety.

2.4.2 Study A of the human element encompasses a wide range of issues that directly impinge on safety, such as

methods of recruitment, training, promotional avenues, welfare schemes, union activities, working environment which, in different degrees, have a bearing on the levels of competence, discipline, commitment and morale of the railway workforce From this vast and complex maze of factors that determine the caliber of the manpower on IR, this Committee has targeted what it considers are the most critical issues for safety

2.5 Recruitment – The RRBs

2.5.1 An issue that is central to the study of the human element in safety is the recruitment structure. A large cross-section of railway officials represented to the Committee that there has been a steady decline in the caliber and commitment of railwaymen over the years. This disturbing and persistent refrain about the degeneration in the quality of railwaymen in general, led the Committee into researching the system of recruitment to the various safety categories of staff on the Railways, as the Committee subscribes to the view that an organization only as good as the manpower it recruits.

2.5.2 The main agency entrusted with the charge of recruiting Class III ta to the various safety categories are the Railway Recruitment Board, known as Railway Service Commissions. The first Railway Service Common had been set up on an experimental best in 1942, the provocation being tar the then existing recruitment process was susceptible to discrimination and bias, and therefore required to be replaced by an independent body. The experiment was successful and in 1946 the number of Railway Service Commissions were increased to six. Subsequently in the 1980s the number

of RSCs were increased to 19, with one in almost every State capital The ostensible reasons for multiplying the number of RRBs was that the workload of recruitment could not be handled by the existing RRBs and also that by dispersing the recruitment agencies to all parts of the country, opportunities for railway jobs would become more universal. However, a study of the actual functioning of the RRBs gives rise to the suspicion that there were other less savoury considerations for increasing the number of RRBs.

2.5.3 The credibility of an RRB as an effective instrument for recruitment depends greatly on the caliber of the individuals heading it. It is precisely in this sphere that there has been some failure. The criteria devised for selection of the Chairman/RRB is flawed and provides considerable scope for accommodating unsuitable persons According to the selection procedure framed for recruitment of the Chairmen/RRBs, the prospective candidates can belong to any of the following categories:

(i) Serving or retired Officers of the Central (including Railways)/State Governments.
(ii) Ex-Members of Parliament
(iii) Men of repute

2.5.4 From the applications received, the Railway Ministry would short-list three names which would be sent to the Union Public Service Commission for ratification of the selected candidate and until such time that the UPSC announces the selection, the Railways can make ad-hoc appointments.

2.5.5 The Committee felt that the mariner of appointments to these critical assignments was unprofessional. Even

minimum educational qualification is not specified. The belief that candidates who do not have the appropriate qualifications for the job, would be weeded out by the UPSC is misplaced. For instance, at one point in 1998, out of the Chairmen of the 19 RRBs, only two had been properly cleared by the UPSC, with the rest working on ad-hoc basis As there was no time limitation for ad-hoc appointments, the UPSC could be side tracked. The Committee found that a large number of "social workers" had been given these important assignments. The Committee's analysis of the educational and professional background of the incumbents to the posts of Chairmen/RRBs during the last five years amply demonstrated that the assignments were not being decided on the basis of professional merit As a consequence, the individuals assigned to these posts were vulnerable to all kinds of unfair pressures because they had obtained their positions, not through merit, but on account of their proximity to the powers that be.

2.5.6 In an attempt to rectify some of the glaring weaknesses in the system of recruitment, the Railway Ministry has recently introduced certain badly needed reforms that would considerably reduce the scope for malpractices in recruitment through the RRBs However, the Committee feels that a more fundamental revamp of the RRBs is required. **The Committee recommends that:**

(i) the posts of Chairmen of the RRBs should be filled up only by serving Railway Officers in SAG who have an outstanding record of service and impeccable integrity.

(ii) the appointments should be ratified by UPSC.

(iii) the tenure of the Chairman should be three years instead of six years as at present.

(iv) to attract talent, the Chairman should be entitled to a special allowance equivalent to 40 percent of basic salary.

(v) ad-hoc appointments to these posts should be dispensed with, and in case of a vacancy, the Chairman of the adjoining RRB should be asked to look after temporarily.

(vi) the RRBs should work towards full computerization in their selection process to achieve complete objectivity, transparency and speed.

2.6 Psychological Tests

2.6.1 A subject that is integral to the process of direct recruitment to critical categories of staff such as ASMs, Asstt. Drivers and Motormen is the psycho- technical testing. As a means to assess certain personality traits that cannot be judged by the conventional examination-cum-interview methods, psycho-testing has been introduced the world over as an invaluable tool to adjudge suitability for high-pressure jobs. On IR, psycho-testing is a vital part of the recruitment process as it should be, and yet the psycho-testing cell is not equipped with the modern tools for conducting the tests.

2.6.2 Set up in 1964 on the recommendations of the Kunzru Committee, the Psycho-Technical Cell was initially engaged in job analysis and research on the psychological attributes required for certain key front-line jobs. Psycho-testing at the recruitment stage was first introduced for the ASMs' category in 1971 and

was gradually extended to cover Motormen and Asstt. Drivers.

2.6.3 Our Committee is concerned about some aspects of the system of psycho-testing. Our Investigations show that test batteries used are of old vintage and need to be upgraded. During our visit to SNCF in Paris and Millenium Drivers' Training Centre of Virgin Rail in London, we were told that perception, logic and mechanical aptitude are important traits evaluated for categories leading to drivers. In the context of the vital role assigned to the Psycho-technical Cell in selecting manpower for the critical safety categories as also for researching the various psychological aspects associated with safety in train operation, **we make the following recommendations: -**

(i) There should be immediate upgrading and revalidation of the psychological tests, and this should be a periodic feature. A competent external professional agency should be asked to do it within the next six months.

(ii) Railways should, in the next three years, switch to a computer-based test package for both test administration and evaluation. In this connection, we would suggest that a multidisciplinary team of Railway Officers should visit the psycho- testing centers of advanced Railway systems such as SNCF, France and Virgin Railway Company, UK.

2.7 Decision to submit Part-I of the Report

2.7.1 During its tours across the country, the Committee was constantly reminded that with the sophisticated

technology being inducted into the Railways, there was urgent need for enhancing the minimum educational qualification for the various jobs. In support of this contention, it was pointed out that even the duties of gangmen, traditionally the preserve of illiterates, have undergone a dramatic change with increased mechanization of track maintenance which demands greater nimbleness of mind and powers of understanding. The Imperative of revising the educational qualifications for the different jobs on the Railways has posed a major dilemma to strike a balance between the demands to safeguard the career prospects of serving Railway employees on the one hand and on the other hand the need to enhance educational and technical cut-offs in the context of technological advancements. Advanced Railway systems have set the minimum educational qualifications for recruitment to the Railways on the principle that the minimum level prescribed should neither be too high nor too low. With a large number of educated unemployed being available, **we have no hesitation in recommending that for any job on the Railways, the minimum educational qualification should henceforth be matriculation.** In our social milieu, certificates for Class IX and under can quite easily be obtained by the undeserving from any obscure school, whereas a matriculation certificate, which is issued by a Central/State level Board, is harder to fake Moreover, the minimum age for recruitment to any Railway job is 18 years, an age when an average student should have completed Class X. The Committee believes that the fears expressed in certain quarters that the Railways

may not be able to attract the required number of candidates with such qualifications for the meniat jobs, are unfounded. On the contrary, the employment notices issued by the Railways even for filling up posts of station porters and gangmen are, in fact oversubscribed, with thousands of applicants for the relatively few jobs on offer and a large number of applications being received even from post-graduates.

2.7.2 The Committee has made a detailed study of the eligibility criteria for recruitment/promotion to posts in the safety categories. **Based on the views of the Zonal Railways and our assessment of the professional requirements for the various safety category jobs, we suggest the following changes in the criteria for recruitment/promotion:**

PROPOSED CHANGES FOR DIRECT RECRUITMENT

Category	Educational Qualification		Quota	
	Existing	Proposed	Existing	Proposed
PWM	10+2 with Science & Maths/Engg Diploma holders are also eligible	B.Sc. with Physics, Maths or Diploma in Civil Engg.	25%	50%
Trains Clerk	Matriculate with minimum 50% marks	10+2 with minimum 60% marks	66.2/3%	No change

PROPOSED CHANGES FOR PROMOTION

Catag ory	Educational Qualification		Age/ Experience		Source		Quota	
	Existing	Proposed	**Existing**	**Propos ed**	**Existing**	**Propo sed**	**Existi ng**	**Propo sed**
PWM	No	Class X	No	No	P/Way	No	75%	Pro-

	restriction against 50% seniority-cum Suitability quota. For balance 25% through LDCE	Board Exam	restriction No change	change	staff	change	including 25% from LDCE	posed 50% including 25% from LDCE.
ASM	Signallers category. No restriction Switchmen's category No restriction	**Class X Board Exam** **Class X Board Exam**	**No restriction** **upto 48 Yrs**	No change No change	Signaller Switchman.	No change **No change**	25% 25%	Total promotion quota to be reduced to 25% with corresponding Increase in OR to 75%
Trains Clerk	No restriction	**Class X Board Exam**	**No restriction**	No change	Eligible Group 'D' categories	No change	33.33 %	No change
ESM Gr. III	No restriction	**Class X Board Exam**	**No restriction**	No change	Deptt/ staff	No change	50%	No change
MSM Gr.III	No restriction	**Class X Board Exam**	**No restriction**	No change	Deptt. Staff	No change	50%	No change
PWI Gr.III	No restriction	**Class X Board Exam**	**2 Yrs. Service**	No change	P. Way Mistry	No change	33.33 %	No change

TXR (LDCE)	Matric	**Act. Apprentice/ITI**	**3Yrs.skilled grade**	Min. 5 Yrs. Experience	Mistry/skilled	No change	25%	No change

Note:*** In between signallers & switchmen, the promotion quota of 25% be divided as per cadre strength of these two categories

2.7.3 In case there is a shortfall in promotions through LDCE, the unfilled quota will be added to direct recruitment quota.

2.8 Discipline

2.8.1 The Committee has noted with concern the all-round deterioration discipline on IR which, inter alia, has resulted in dereliction of duty and non-observance of rules and procedures becoming rampant. Apart from laziness, the general las atmosphere prevailing in the country and decline in the moral standards have led to this culture which, in tum, has engendered apathy and a casual approach to work. All these features are fraught with extreme danger and cannot be allowed under any circumstances in an operational organization like R. For instance, in the collision at Maheshmunda on Eastern Railway last year it was clearly established that in the case of defective signals, piloting of not done by station staff as prescribed under the rules, and drivers also do expect any one at the foot of the defective signal.

2.8.2 Decline and total dedication to duty are a must in an organic A and have to be willy nilly enforced and crusted only in the context that the Committee at the very beginning had observed that railway working is like that of the Armed forces which requires a high degree of discipline. This issue will be taken up in detail in our Final Report.

2.9 Training

2.9.1 Even as we approach the end of the Millenium, the Railways is faced with the challenge of adapting to the complexities of a technology-driven world. If the Railways is to survive as a viable, healthy and vibrant Organization, it is imperative that appropriate institutional structures are put in place to ensure that the individual capabilities of railway staff are enhanced through proper training. With kaleidoscopic changes in technology, the Railways is already wrestling with the problem of workers embodying certain skills which are not suited for the new technologies. One of the recurring complaints of the Railway managers is that the skill-profile of the Railway workforce in many areas is deficient. With the increasing sophistication of equipment being inducted into the Railways, it is crucial that the staff assigned to operate and maintain such equipment have the necessary skills. For instance, during our visit to Germany we saw a new drivers training school set up exclusively for training staff on the latest version of their high speed train, i.e., ICE Mark III. Apart from recruiting individuals with the right kind of qualifications and aptitude an issue dealt with earlier, it is imperative for the Railways to anticipate the skill requirements for the different jobs and reorient training programmes accordingly.

2.9.2 Training of staff assumes greater importance for one more reason. So far due to historic compulsions, IR's recruitment standards did not keep pace with the technological advancements. As a result, today skills of a large number of existing employees need radical

upgrading/change which can be accomplished only through special training.

2.9.3 We are firmly of the view that appropriate training at periodic intervals is essential throughout service for upgrading skills as also for refreshing and acquiring new knowledge. In the course of our visits to the Zonal Railways, we discussed the issue of training with officers, unions and staff. We also sent out questionnaires to the Zonal Training Centres and Systems Training Centres, the replies to which have helped us to identify the areas in the training field which need to be strengthened.

2.9.4 The success of a training programme depends not only on the aptitude and keenness of trainees but is also largely determined by the knowledge and teaching skills of the trainers. As the most vital cog in the entire scheme of training, the instructors need to be professionally competent, with adequate field experience and a flair for teaching. In order to attract the very best talent from amongst the eligible staff, the Railways had decided in the 1980s that the training fraternity in the training institutions would be eligible for 30 percent of basic salary as teaching allowance. This was in recognition of the trainers' special attributes, his tremendous potential to contribute, in line with World practice and to compensate in some cases for loss of allowances associated with field postings. The Railway administration subsequently took a step backward in 1995 by reducing this allowance to 15 percent of the basic salary. We are of the view that the reduction in the allowance was a step in the wrong direction as it diminished the stature and attraction of

the instructors' posts. **We now recommend that the teaching allowance should be fixed at 40 percent of the basic salary in all Railway training institutions as this will help draw individuals of high calibre to take up these critical assignments.**

2.9.5 We found that there is general reluctance amongst Railway staff to attend training courses, and one of the main reasons cited for this apathy to training is the dislocation and monetary loss incurred due to maintaining two establishments during the training period and loss of certain emoluments linked to the field jobs. **We recommend that as a small incentive, the trainees should be provided free food during the period of training in addition to normal DA.**

2.9.6 We also recommend that successful completion of a training course should be linked to promotion/increment. Apart from incentives, we recommend that:

(i) when any staff belonging to a safety category becomes overdue for refresher training, he should be taken off duty until such time as he completes the training.

(ii) attributes required for a trainer should be carefully observed in these training courses and noted in the trainees' personal record to facilitate future selection as trainers.

2.9.7 With regard to the actual content of training in the training institutions, **we make the following recommendations:**

(i) **The training courses for officers and supervisors should contain a capsule on "how to conduct accident enquiries".** We observed

that besides "departmentalism" vitiating accident enquiries, the lack of skills and knowledge of the enquiry officers is also responsible for occasional poor quality of the accident enquiry reports.

(ii) Yoga and meditation have been universally recognized as an invaluable tool to fight the tensions, the emotional stress and pressures that are an integral part of our present-day world. **Yoga and meditation lessons should be imparted to trainees in all the training institutions.**

2.9.8 We feel attractive opportunities should be provided to the staff to enhance their professional skills during the course of their service. In this context, we endorse the recommendation made in the RITES Report "Rationalization of Freight Operations through Optimized Maintenance of the Wagon Fleet on Indian Railways" that **in order to upgrade the skills of existing staff, they should be given liberal incentives to join ITI Courses, with Railways even reserving seats in reputed ITI institutions for deserving Railwaymen. We recommend that all staff belonging to the technical categories who are enrolled in a recognized ITI Course should be granted study leave with full pay and allowances for the duration of the course.**

2.9.9 It is also vital that the Railways improves its training methods and goes beyond the conventional lecture-room system of training. We were impressed by the package based on multimedia (CD ROM, Video film, lecture notes, slides) and facilities for Air-brake Systems developed by IRCAMTECH, Gwalior in

collaboration with the Technical Teachers Training Institute, Bhopal. IRCAMTECH and other Railway training institutions should produce similar training packages for supply to Zonal Training Schools (ZTS) which should be equipped to utilize the same. Other training material used by ZTSs should be improved and approved by specific central training institutions to which each should be affiliated. The success of the experiment should embolden the Railways to extend the scheme of competency- based training and certification to cover the staff in workshops and open line dealing with safety-critical assemblies. **We recommend that competency based training and certification should be introduced, in stages, in work-centres such as TXR Depots, Sick lines, ROH Depots, Workshops, Flash Butt Welding Plants etc. Only those possessing certificates of competency should be allowed to work on the identified safety critical assemblies.** The certificate or licence should be valid for only 5 years with compulsory renewal thereafter, which will ensure that competencies keep pace with changes and upgradation in technology.

2.9.10 For proper implementation of the scheme outlined above, it is necessary that the teachers/trainers of the training institutions attached to workshops, shells and depots are first trained and adjudged suitable for imparting the competency based training**. An all-India body like IRCAMTECH may be entrusted with the task of providing certification of the competence of teachers/trainers so that uniform and adequate standards are enforced.**

2.10 Technical Aids

2.10.1 On IR, with increasing traffic and more work pressure on staff, the potential for human error has increased. This is why our committee believes that induction of appropriate safety-related technology should form a crucial plank in the safety strategy of the Railways as it can substantially reduce the risks associated with human error and negligence. The Committee has examined technology requirements from many angles in the context of the problems faced by the IR. Since such technology is costly, there has to be careful prioritization even among the essentials of safety especially with the huge financial resource crunch being faced by IR. Due to the existing environment, aspects like theft proneness, work culture, socio-economic conditions, maintainability, availability of spares, obsolescence, possibility of indigenization, etc., have also been kept in mind. We have no doubt that acquisition of the appropriate technological systems would not only enhance safety but will also increase productivity and eventually improve financial viability.

2.10.2 The Committee after extensive study has come to the conclusion that technology progression on IR has hitherto been somewhat tardy. The IR has experimented with a host of technical safety aids but many of them have not led to fruition. Even technology that is accepted as necessary and basic such as track circuiting of stations has been progressing in fits and starts despite the Importance assigned to it by the Kunzru Committee as far back

as 1962 and emphatically reiterated by the Wanchoo and Sikri Committees thereafter.

2.10.3 From among the bewildering array of safety-related technological aids available, we have identified the following for Immediate introduction/extension on IR as we consider these to be essential for ensuring an acceptable level of safety.

2.11 Decision to submit Part-I of the Report

2.11.1 For quite some years, the Indian Railways has recognized the importance of having some form of communication between the train driver, guard, adjacent Station Masters, approaching trains and control office as a means to prevent accidents such as those triggered by derailments infringing the other line, by poor visibility due to fog, etc. **We are of the view that a reliable communication facility between driver, guard, ASM, level crossing gate and approaching trains should be provided as a first step within 3 years on 'C' and 'A' routes and in another 3 years on 'B' route. We also feel that once optical fiber backbone is in place, the communication facility should be extended to control office. The system should have in-built call override, broadcast, and SOS facilities.** The approximate cost of our recommendation is as under: -

Route	Approximate Cost	Time frame	
'C' & 'A'	240 crores	3 years)	Total 6 yrs
		)	
"B"	250 crores	3 year)	

2.11.2 The universal emergency communication system being tried out on IR is a simplex system and has only one voice channel. The performance of this system may not be quite satisfactory in an emergency when more than one channel may be required. We have, therefore, calculated costs on the basis of a duplex system with multiple voice channels and features detailed in para 2.11.1.

2.12 Train Protection and Warning System (TPWS)

2.12.1 Our analysis shows that roughly 75 percent of the train accidents on IR are caused due to human error. Of all the categories of railwaymen who contribute to train running, the most critical and also the most vulnerable are the drivers. The cost, in terms of human life and suffering, due to the errors committed by drivers, basically passing signal at danger, has been enormous During the five years between 1993-94 to 1997-98, there were 180 collisions resulting in 734 fatalities and 1422 injuries. Drivers were responsible for 114 of these collisions, I.e., more than 60 percent. Despite rigorous monitoring of drivers and improvement in their working conditions, IR continues to have a substantial number of collisions every year due to lapses by drivers. Signal Passing at Danger (SPAD) is a phenomenon causing worldwide concern. We found that there were about 500 SPAD cases every year in each of the countries we visited in Europe (France, UK, Germany). Technological solutions have, therefore, been developed to provide assistance to drivers in this matter, thereby reducing fatalities due to collisions. After having

studied and discussed the various pros and cons of the available systems, the Committee recommends **adoption of a suitable system, which should have the following features: -**

(ii) When the driver crosses a 'caution' or 'yellow' signal, he should receive an audio-visual warning which he must acknowledge. Failure to acknowledge the warning in specified time will result in automatic application of brakes and stoppage of the train. The system will log every such occurrence.

(iii) After the 'caution' signal and on approach to the 'stop' signal, at an intermediate point the speed will be checked. Brakes will apply if the train speed exceeds a specified limit and there is probability of a SPAD occurring at the next 'stop' signal.

(iv) Brakes are applied and the train comes to a halt if the driver crosses the signal at danger.

2.12.2 The Railways has taken up a pilot project on Delhi-Mathura section for a radio-based AWS in collaboration with UIC.

2.12.3 The Committee has serious reservations about the suitability of a radio- cum-satellite based system on account of: (1) its much higher cost, (ii) security risk in times of emergency, and (iii) possible difficulty in getting the desired frequency band on an all-India basis. We are aware of the positive features of the radio-cum-satellite based system, viz., non-pilferability, extension of train control to temporary speed restrictions, and pin-pointing the

exact location of each train. Since the disadvantages far outweigh the advantages, we have not recommended this system.

2.12.4 The Committee during its visits to SNCF and DB was apprised of a Balise-based TPWS. The Balises are made of fiber glass body and electronic circuits with very little copper of theft value. The Committee feels that the Balise based system is better suited to our conditions and will be cost effective. **We recommend that development of a Balise-based TPWS having the features as enunciated in para 2.12.1 should be taken up immediately by IR.**

2.12.5 The timeframe recommended by the Committee and the approximate cost for providing the TPWS on the 'C' and 'A' routes of IR are indicated below: -

Route	**Approximate cost**	**Time frame**	
'C'	Rs. 100 crores	2 years)	Concurrent
		)	
'A'	Rs. 910 crores	5 years)	

2.13 Track Circuiting of Stations

2.13.1 Track circuits detect the presence of a train or vehicle on a particular line and ensure that the signal for that line cannot be taken off. Track circuiting of stations was first introduced on IR

almost four decades ago as a means for ensuring that errors by station staff did not result in accidents due to a second train being received on an occupied line. Every Accident Enquiry Committee had recommended early installation of this technical aid at all stations on IR. However, for various reasons, the progress of track circuiting was slow until the major mishap at Ferozabad in August 1995, after which track circuiting has become a prime focus of the Railways. However, there is still considerable ground to be covered**. We recommend that complete station track circuiting should be done according to the priorities and time frame indicated below: -**

Route	**Estimated Cost of balance work**	**Time Frame for completion**	
'A'	Rs.190 Crores	2 Years)	Concurrent
		)	
'B' & 'C'	Rs.520 Crores	3 Years)	
'D' Spl. & 'E' Spl.	Rs.290 Crores	3 Years	After A, B & C

2.14 Drivers

2.14.1 In its most basic form, the Railways is essentially track, rolling stock and the driver. Our committee feels that one of the most vital elements to be factored into the safety strategy of the Railways is the driver. It is important for the health and safety of the system that this category of staff is provided with the very best in terms of emoluments, training, working conditions, etc. It would appear that the Railway management has done little besides

attending to the aspect of monetary emoluments for the driver. Considering his critical positioning in the railway machinery, we feel other aspects should also be improved.

2.14.2 Most of the drivers who responded to the questionnaire circulated by the Committee, complained about the drab and cheap gray uniform that has been supplied to the driver which is a shocking contrast to the smart uniforms worn by the train superintendents, conductors, commercial staff and guards. **An immediate step that the railway management should take is to upgrade the uniform of the drivers, which will help to instill in them a sense of pride.**

2.14.3 An aspect which is of great importance in ensuring a driver's well-being and alertness on duty is the condition of the Running Rooms. We found that the conditions in the Running Rooms inspected by us were unsatisfactory. The entire corporate thinking on Running rooms will need to undergo a major change. The earlier Committees had also stressed on this matter but improvement has been inadequate. **The Committee recommends the following to be implemented within three years:**

a. **Basic amenities like proper hygiene, toilet facilities and clean drinking water to be ensured immediately.**
b. **Not more than two beds per room/cubicle.**
c. **Proper ventilation and lighting.**
d. **Desert Coolers.**
e. **Subsidized meals.**

f. A reading room with magazines and papers.

g. Every running room of 20 beds or over should have a full-time supervisor in-charge.

2.14.4 We consider that regular refresher training is essential for drivers. **Any driver overdue refresher training should be treated as being without a licence to drive and taken off driving duties. Such a driver should also be deprived of any allowance concerning driving until he joins the refresher course.**

2.14.5 With regard to training, **it is necessary that apart from the conventional methods of lecturing to the trainees, interactive training with personal computers should be introduced on lines similar to that available in some of the advanced railway systems such as in the Drivers' Training Centre, Fulda in Germany.**

2.14.6 It is also well established that simulator training is a most effective means for enhancing driving skills. We understand that 4 simulators are already in position and 12 more dynamic simulators are being procured. **We recommend that this action should be completed forthwith so that within the next one year IR has 16 simulators.**

2.14.7 With regard to road learning, the existing rules specify a minimum of three trips for learning the road**. We recommend that it be further stipulated that one of the trips should be in the night hours between 2000 hrs and 0600 hrs as**

the experience of driving at night is altogether different from day time driving.

2.14.8 The railways has a system of categorising drivers on the basis of driving skills, trouble shooting expertise, etc. Drivers categorised as 'C' are considered to be a safety risk. But there is no uniform practice on the various zonal railways for dealing with such drivers. On Southern Railway, in case a driver is classified as 'C', he is taken off the foot-plate and sent for a confidence building course. If he is found fit after such training, then he is upgraded, but otherwise sent back again to repeat the course. In case he fails a second time, then he is grounded permanently. **The Committee recommends that the approach adopted by Southern Railway for dealing with 'C' category drivers may be adopted countrywide.**

2.14.9 The grading of drivers is done by the Loco Inspectors. **It is important to make the LI accountable in case it is found that the grading was not done appropriately.**

2.14.10 At present an individual who joins as an Assistant Driver normally ends his career as a Driver. In order to improve the promotional prospects of this category, **the Committee recommends that special 'A' grade drivers having requisite qualifications should be eligible to appear in the Limited Departmental Competitive Examinations for AME/AEE just like motormen.** By thus improving the avenues for career advancement the railways would be able to attract better talent to this category.

2.14.11 There is no better guide than the driver to indicate to the management the problems and shortcomings of the section he has foot plated. Although a register exists in many lobbies for defects/deficiencies noticed by the driver on the run, in actual fact drivers have lost faith in the system because there is little or no follow-up action on his observations. The Committee made a random check on the system followed and it was found that while the driver's observations were being conveyed to the Power/Traction Controller on phone with exchange of private number, nothing much happened thereafter. In some cases the driver's observations were conveyed to the concerned department, but there is no system to ensure compliance. **The Committee recommends that:**

(i) a register to record driver's observations during his run must be maintained in all lobbies and this information should be conveyed to Traction/Power Controller under exchange of private numbers.

(ii) the Power/Traction Controller should, in turn, convey these observations to their respective counterparts of the concerned departments under clear acknowledgement.

(iii) the observations of the driver as conveyed by the Power/Traction Controller to the respective counter parts of the concerned department should be faithfully recorded in the register dedicated for this purpose.

Follow-up action taken should be recorded within 24 hours which should be monitored by the Divisional officers as well as Divisional Safety Officer.

(iv) the information regarding action taken on the reported defect should be conveyed back to the lobby for information of the driver so that he has confidence that action has been taken on his observation. Disciplinary action should be initiated against the concerned supervisors in case the same defect resurfaces within the next 72 hours.

2.15 "Doctored" Statistics

2.15.1 One of the factors bedeviling the safety performance of the IR has been the widespread manipulation of accident statistics. Over the years the definition of what qualifies as a train accident has remained unchanged, but Railways has completely distorted the statistics. While the Railways has been assiduously reporting train accidents that have resulted in injury or loss of life or substantial dislocation to traffic, the relatively minor train accidents have been swept under the carpet. The extent of under-reporting of train accidents can be gauged from the figures given below which have been furnished to the Committee by the Zonal Railways:

RAILWAYS	No. of accidents in 1996-97		No. of accidents in 1997-98	
	Reported	Unreported	Reported	Unreported
Central	57	NA.	65	76
Eastern	31	87	27	86
Northern	58	NA	48	NA
North-Eastern	21	63	24	59
Northeast Frontier	18	80	20	83
Southern	40	25	66	Nil
South Central	42	295	37	324
South-Eastern	66	297	63	259
Western	44	161	42	118
Metro	1	Nil	1	Nil
Konkan (KRC)	3	11	3	6
TOTAL	381	1019	396	1011

N.A. Not available

2.15.2 One of the important motivations for manipulation of statistics is to show improved performance year after year. Most of the officers try to show better performance than their predecessors**.**

2.15.3 Apologists for the current methods of statistical dissimulation advance the argument that as all significant accidents are being reported and acted upon, and only the minor accidents blanked out, the system's failures on the safety front are adequately brought to light for remedial action. What is conveniently forgotten is that the gravity of consequence in any accident is fortuitous, as the basic causes for both minor and major accidents are essentially the same. To cite but one example, a rail fracture may cause a minor derailment of one wheel of a goods train which would have a negligible impact on train operation whereas a similar rail fracture also triggered the sequence of

events leading to the nightmarish accident at Khanna in November 1998 which resulted in 212 deaths.

2.15.4 Any Railway management which claims to accord the highest priority to safety has necessarily to inculcate the attitude that every on-line failure of rolling stock, track and signals is potentially catastrophic. At the root of every train accident is some type of failure and proper compilation and analysis of failures provides the Railway management with the basic data for risk assessment and for establishing the priorities for safety decisions and investment. In the Final Report the subject of failures will be dealt with in detail.

2.15.5 It is important, at least, to record and assess all significant aspects of accidents so that the unhealthy practices are identified for remedial action. The manipulation of accident statistics has made it well nigh impossible to arrive at any meaningful conclusion about the underlying causes of accidents. With incomplete data to go by, no clear discernible trends are available to assist the management to focus on the vulnerable areas in the system with the result that sometimes, problems escape identification for appropriate remedial action.

2.15.6 A classic example of how this obfuscation of facts is resulting in corporate inaction is seen in the compilation of accident statistics involving CRT and 4-wheeler tank wagons. According to the official statistics these wagons are only a little more prone to derailments than other types of vacuum-

braked wagons. This conclusion is, however, far removed from reality as was brought home most forcefully during a presentation made by South Central Railway which showed that the vulnerability of these wagons to derailment was very high. According to the factual statistics, CRT wagons constitute 6.3 percent of the South-Central Railway's wagon holding but contribute 34 percent of the derailments, 42.6 percent of enroute detachments, and 10.5 percent of train partings. The 4-wheeler tank wagons constitute 63 percent of the holding but contribute to 19.2 percent derailments, 28.2 percent enroute detachments and 10.5 percent train partings. Similar facts were reported by Southern Railway

2.15.7 The distorted feedback from the field has to some extent failed to bring out valid trends for the management to take corrective action. With no follow-up action on the non-reported accidents, unsafe practices down the line are not detected until a major accident occurs.

2.15.8 It is difficult to pinpoint the exact period when the manipulation of accident statistics started, but it has apparently been going on for years. Even the Sikri Committee set up in 1978 hinted that all was not right with Railway statistics. It is not as if the entire Railway management was happy with this self-defeating manipulation. Some in the top management of the Railways tried to control and restore the health of the safety-related records. These well-meaning officials were, however, discouraged from implementing this much needed

change. As a result, the Railways remains imprisoned by its own past and unable to remedy the situation. The Committee recommends:

(i) that the Railway management should immediately correct all distortions in compilation of accident and other safety related statistics. No comparison need be made with past statistics as the two sets of figures would be incompatible.

(ii) It should also be made clear to officials down the line that an act of suppression of any accident or asset failure will be viewed to be as grave an offence as being responsible for causing an accident.

(iii) A Gazette Notification to this effect should be brought out to publicize these instructions.

(iv) The concerned Station Master must issue, as per rules, an all concerned written message regarding the accident within 12 hours. Otherwise, it will be considered as a failure on his part.

(v) (v)Within one hour of the occurrence of the accident, the Control Office should record the details in a standard format, preferably on a computer which is networked with Headquarters and Railway Board. The system should be such that deletion of an entry is not possible.

2.15.9 A new management ethos should be evolved which will encourage and aid honesty even in admission of failure.

2.16 Procurement of Safety Items

2.16.1 The most skilled manpower and the finest maintenance practices can achieve little if the materials required for upkeep are sub-standard or unavailable.

In a presentation made to the Committee, the Chief Commissioner of Railway Safety stated that one of the major problems adversely affecting safety was the sub-standard spares and material procured by IR. Our own experience during our field visits reinforced the point made by the CCRS. Everywhere, we heard the standard litany of complaints regarding the poor quality of material supplied, as also non-availability of spares. As Material Management is integral to safety, we made a study of the procurement policy of IR, especially in relation to those materials identified as "safety" items.

2.16.2 Although Railways acknowledges the vital need for ensuring quality and timely supply of safety items, it is yet to produce a reliable and universally applicable list of safety items, which is a fundamental requirement for proper material management. **We recommend that RDSO should be assigned the task of preparing a comprehensive list of safety items within the next three months to be used by all Zonal Railways and Production Units.**

2.16.3 The most critical aspect of the entire procurement cycle is identification of the right vendor, because only then can quality of product and timely supply be ensured. However, we find that the present

system of registration of vendors is flawed and a number of firms with inadequate credentials have been approved for supply of even safety items. Our committee is convinced that unless this debilitating problem of vendors supplying inferior safety spares is ruthlessly stamped out, there can be no significant improvement in the safety of the train running. This being so, the Railways must accord the highest priority to drawing up an approved vendor list for safety items.

2.16.4 The other problem is that the system of getting feedback regarding performance is very poor, on account of which updating of the list is not done. The absence or illegibility of identification on the component is one more constraint in pin-pointing the poor supplier.

2.16.5 We recommend that RDSO should be entrusted with the task of drawing up such a region-wise vendor list for safety items. This approved list should indicate the production capacity of the firms so that an adequate number of vendors are approved. RDSO should also develop a system of getting feedback from the consumers and rate the vendors periodically for retention in the list. For this purpose, proper identification marks of the manufacturer should be legibly embossed on components.

2.16.6 It was reported that safety items such as spares for air-brake systems, shock absorbers, slack adjusters etc., are frequently out of stock at the maintenance depots, with consequent adverse implications due to non- replacement of worn out components. In

order to overcome this problem, **we recommend that the Railways should take recourse to rate contracts for fast moving components and authorize officers in charge of the depots to operate them.**

2.16.7 Constraint of funds is frequently cited for delay in procurement of material/spares. The Committee recommends that **items specified in the Safety List should get overriding priority in procurement. Non-stock items declared necessary for safety by the concerned PHOD should also get similar over-riding priority.** Since the cost of safety spares forms only a fraction of the total budget for spares, **availability of funds certificate should not be required. The concerned PHOD will, however, ensure that the total budget is not exceeded.**

2.16.8 Our discussions with the Zonal Railways revealed that the purchase procedures are so convoluted that delays in procurement are inevitable. The Northeast Frontier Railway indicated that there are 13 steps involved for procurement of stock items and 17 steps and formalities to be observed for non-stock items. The Railways has, for long, recognized that the entire procurement system needs revamping but there has been no significant improvement mainly because of an unwillingness to break free from the bureaucratic system of checks and counter checks. **We recommend that a Management Consultancy agency of international repute should be assigned the task of simplifying the procurement procedures on IR.**

2.17 Long Term Contracts

2.17.1 The present system followed on the IR is placement of annual contracts and there is no system of long-term association with the suppliers. The short-term relationship with suppliers suffers from the following infirmities:

(a) non-involvement in product improvement by way of R&D efforts.

(b) order booking in excess of capacity for one time profit leading to non-adherence to delivery schedules.

(c) maximization of profits by cutting corners.

(d) lack of interest once the product is accepted after inspection.

2.17.2 The world over organizations, including public sector companies in India like Maruti, Punjab Tractors and HMT, have switched to a system of having long-term continuing relationship with selected suppliers. The system aims al creating and nurturing an environment of mutual trust where certainty of orders is not doubt, provided quality and timely supplies are ensured. Systems followed by different organizations vary but the underlying principle is the same.

2.17.3 While some studies on long term contracts have already been carried out including one recently by the Committee on Review of Railways Parches Policy and Procedures (April 1994), the Committee recommends **that the management consultant of repute suggested in para 2.16.8 be abo asked to study this aspect and suggest a suitable procedure.**

2.18 "Doctored" Statistics

2.18.1 One of the important matters which has not received due attention despite repeated emphasis of past Committees is the replacement of overaged assets. The following position as on 01.04.99 indicates the sorry state of affairs: -

Arrears of track renewals (BG)	12,260 Kms
Distressed bridges	262 Nos.
Overaged signalling gear	1560 stations
Overaged coaches (BG)	1,322 Vehicle Units
Overaged wagons (BG)	34,000 (in terms of 4-wheeler units)

2.18.2 The Committee knows that safety enhancement costs money apart from commitment in terms of time and involvement. The Committee is also aware that the Railways has a financial resource crunch which necessarily means prioritization of investments on safety. In determining the investments on safety the Committee cannot, however, overemphasize the need for the Railways to accord the highest priority to the basic nuts and bolts of safety which are manpower, track, bridges, rolling stock and signals. While the issue of manpower is dealt with separately, the Railways should adopt an action plan aimed at restoring the health of its prime physical assets. **The Committee recommends that pulling up the backlog in arrears in renewal of track, bridges, rolling stock and signalling gear should be the prime focus of the Railways. At all times there should**

be a time-bound plan to clear the arrears as also the fresh accruals.

2.18.3 We are aware that the Railways is not in a position to fully finance the level of investment required to pull up arrears of renewal of track, bridges, rolling stock and signalling gear from its own resources. However, the Committee is also convinced that this issue will brook no further delay. As this is an issue that directly affects the safety of the travelling public, the Central Government must not allow this problem to persist on account of Railways' inability to find the resources for this most essential need for maintaining the requisite standard of safety on the Railways. **The Committee, therefore, recommends that in the interest of safety, the Central Government should provide a one- time grant to the Railways so that the arrears in the renewal of track, bridges, rolling stock and signalling gear are wiped out within the time frame specified by this Committee.** We are convinced that if such a financial bailout is not forthcoming, improvement of safety on the Railways can, at best, be halting, slow and marginal. **We also recommend that projects which are financially and operationally not justified but are taken up for other reasons should be fully financed outside the Railway Budget and should be exempt from the payment of dividends.**

Over Aged Signalling Gear

2.18.4 As mentioned in para 2.18.1 there are 1560 stations with overaged signalling gear on the IR. Against a

codal life of 25 years, at many locations signalling gear is of much older vintage. This leads to an unsatisfactory situation in which failures and accidents occur**. Our committee recommends that the over aged signalling gear should be replaced as follows:**

(1)	**On 'A' and 'C' routes:**
	Over 35 years old in 2 years' time (cost Rs.243.4 Crores), and
	25 to 35 years old in the next three years (cost 401.5 Crores).
(ii)	**On the remaining routes on condition basis.**

Track Renewals

2.18.5 Track overdue renewal is bad for railway operation and safety as it leads to disruptions and accidents. This, along with speed restrictions, results in choking of throughput. Every Committee has underlined the need to wipe out track renewal arrears in the shortest possible time. Unfortunately, this primary requirement of safety has not been allotted adequate funds and has been subsumed by other less pressing concems such as the Project Uniguage. It is distressing to note that the **arrears of track renewals which were about 6000 Kms in 1978 have mounted further and are now 12,260 Kms on the BG alone which is over 20 percent of the total.** We find that from a high of 3669 Kms of track renewals achieved in 1989-90, the rate of renewal has been steadily declining, and only 2967 Kms of tracks were renewed in 1998-99. Viewed in the context that the yearly fresh accruals have been

assessed at 3250 Kms, the prospects for the future become even more grim. The route-wise position of BG track overdue renewal as on 01.4.99 is as under:

Route	**'A'**	**'B'**	**'C'**	**'D'Spl.**	**'D'**	**'E'Spl**	**E**	**Total**
Kms.	2179	2560	251	1193	1745	678	3655	12260

2.18.6 The position is critical and must be dealt with on a war footing, as we consider this a basic and fundamental requirement of safety. Inadequate outlays for track renewals as in the past, should not be allowed to persist. Considering the severe financial constraints, the Railways will have to draw up stringent priorities, and in the Committee's view, the renewal of track should be accorded very high priority, even if it involves sharp reduction in allocation of funds to projects linked to network expansion such as new lines, gauge conversion projects, electrification etc. **The recommendation of the Committee is that the Railways should pull up all arrears of track renewal in a time-span of seven years.** Our arithmetic is as under:

Current Arrears	**Arrears in next 7 Years**	**Total Arrears in next 7 years**	**Yearly Renewal to be achieved**
12260 Kms	3250 x 7 = 22750 Kms	35010 Kms	5001 Kms

Annual requirement of funds at 65 lakhs per Km (current costs) = Rs. 3250.65 Crores

2.18.7 There is another aspect of track renewals which is a matter of great concern. According to the

prescribed yardstick, track is identified as due renewal on the basis of GMT carried and/or superannuation in the age of sleepers. The Committee noted that of the track renewals sanctioned in the three years 1994-95 to 1996-97, between 31 to 38 percent of track had been prematurely earmarked for renewal on the basis of "condition". There are many reasons for this like: -

(i) poor quality of track material, specially rail.
(ii) non-replacement of track components like ballast, resilient pads, elastic clips, etc., which have a considerably shorter life span.
(iii) proliferation of wheel flats.
(iv) over loading of wagons.
(v) underpowering of trains.
(vi) insufficient track maintenance etc.

These issues will be covered in detail in our Final Report. The Committee is of the view that as far as possible premature condemnation of assets should be avoided through improved maintenance practices.

Distressed Bridges

2.18.8 A bridge constructed in 1925 and converted into a flat top slab in 1986 collapsed in 1997 on Eastern Railway. This was not among the hundreds of bridges that the Railways had identified as "distressed" requiring rehabilitation. This happened despite the regular schedule of inspections by the nominated officials. The conclusion that the Committee had drawn from this incident is that the quality of construction of some bridges is not up to

the mark and the existing standards of maintenance/inspection are insufficient.

2.18.9 With too many variables, precise guide lines for declaring a bridge distressed are not possible. One could easily err on the wrong side and be faced with a sudden collapse as internal flaws of steel, concrete or masonry cannot be physically inspected.

2.18.10 Out of 1,19,724 bridges that straddle the IR network, there are 51,340 bridges which are of 19th century vintage. Going by the thumb rule of structural engineers that life of a bridge is around 100 years, the IR is faced with a grave problem. In the absence of scientific evaluating techniques for assessing bridges, necessarily there is subjectivity in declaring bridges as "distressed". According to the Indian Railway Bridge Manual, a "distressed" bridge is one which shows signs of deterioration in its physical condition indicating the need for rehabilitation through special repairs or rebuilding.

2.18.11 Considering the critical importance of this subject to safety, **we recommend that within one year all bridges that are today declared as "distressed" and others over 100 years in age, or of early steel, should be subjected to a super check by a task force, on each Railway, headed by a specially selected senior administrative grade officer for quick structural assessment and immediate remedial action. Each Task Force should be equipped with state-of-the-art non-destructive testing equipment now available.**

The project should be coordinated by the RDSO.

The Committee recommends also that the rehabilitation/rebuilding of distressed bridges should be accorded a high priority on par with track renewals.

2.18.12 As projected in the Railways' 9th Plan document, the funds required for refurbishing/rebuilding all the distressed bridges amount to about Rs. 650 crores **The Committee recommends that the rehabilitation of "distressed" bridges should be completed in a time span of 5 years along with fresh accruals.** This will mean a yearly allocation of approximately 130 crores for bridge works over the next 5 years against the current annual expenditure of 58 to 60 crores.

Overaged Coaches and Wagons

2.18.13 In our scale of priorities, the issue of over-aged rolling stock ranks lower than track overdue renewal and distressed bridges, for the simple reason that if a particular coach or wagon is unsafe, it can be withdrawn without seriously affecting rail services. However, recourse to such a measure to deal with over- aged track would have grave and unacceptable repercussions as it would involve suspension of all traffic over a line. There are, however, a few aspects of overaged rolling stock impinging on safety which, in the Committee's view, should receive the immediate attention of the Railway management.

2.18.14 There are 1322 over aged coaches on the BG and 1243 over aged coaches on the MG. These should be withdrawn from service within a period of three years. There are around 34000 overaged wagons (in terms of 4-wheeler units) on the BG and 8750 wagons on the MG. These should be phased out in the next five years.

2.19 Phasing out of Unreliable Wagons

2.19.1 CRT Wagons

According to the Mechanical department of South Eastern Railway, the main reason for reduction in accidents on Mechanical account was the banning of movement of CRT wagons over the South Eastern Railway network. Earlier in this report, it has been mentioned that the GM/South Central Railway in his evidence before the Committee, had shown that the **CRTs, although constituting only 3.1 percent of the fleet, contributed 34 percent of the derailments, 42.6 percent of the en-route detachments for sickness, and 10.5 percent of the train partings.** Empirical evidence in the form of accidents and on-line failures clearly underline the fact that CRT wagons are accident-prone and unreliable. Since these wagons were first introduced on IR, the RDSO has recommended many modifications to improve their reliability. In December 1998, RDSO had suggested further modifications on CRT wagons which are to be effected by Perambur Workshop. According to an estimate given by Southern Railway, the modification cost for one CRT wagon is approximately Rs.60,000/-- Keeping in mind the

historical background, it is unlikely that even these major modifications will succeed. Not only are these modifications complicated and expensive, but also difficult to maintain. Considering their poor productivity and accident prone-ness, the Committee endorses a commonly held view that these wagons are counterproductive and a drag on the system. **We recommend that the CRT wagons should be withdrawn from commercial use.**

2.19.2 BOX Wagons

IR has a fleet of around 27,000 BOX wagons (vehicle units). Production of these wagons was suspended in 1983 when the newly developed BOXN wagon was introduced. Volumetric capacity of the BOX wagon permits considerable over-loading even with coal, a feature which has been heavily exploited by unscrupulous traders resulting in breakage of springs and cracks in the bogie, apart from damage to track. Further, as the BOX wagon body is made of mild steel, carriage of corrosive commodities like wet coal completely eats up the body, making the wagons structurally weak. All this has made the wagons unreliable and they cause 37 percent of wagon detachments while their holding is about 12 percent of the IR fleet. From the safety point also, the performance is not very good on account of heavy breakages of axles/journals and springs.

2.19.3 The codal life of all wagons on IR is 35 years. A BOX wagon is tippled for unloading and this causes considerable additional damage. The result

is that as the wagon gets older, the repair cost mounts up, very much more than the covered wagon which does not carry corrosive material and is not subjected to tippling operations. **Considering the condition of the BOX fleet and their unreliable performance, the Committee recommends that their codal life be reduced to 25 years. This would mean immediate phasing out of approximately half of the BOX holding.**

2.19.4 Four-Wheeler Tank Wagons

While the vulnerability to derailment of four-wheeler tank wagons has been reported by various railways, the Committee proposes to look into this and comment on it in the Final Report.

2.19.5 The Committee recommends that **CRTs (till withdrawn) and four-wheeler tanks which are derailment-prone should preferably be utilized only on single line routes to avoid the possibility of major disasters like Khanna and Bad.**

2.20 Rail/Weld Fractures

2.20.1 The Committee is convinced that ral/thermit, weld fractures are one of the very important subjects to be dealt with on priority. Incidentally, UIC (Union of World Railways) has also identified this as one of the most important problems affecting Railway Safety all over the world. They have set up an International Working Group, of which India is a member. On IR the subject has special importance as for decades, the new rail procured has had a very large number of defects due to shortcomings in the rail manufacturing process.

2.20.2 Till a few months ago Bhilai Steel Plant, the only indigenous manufacturer of rails, left a large number of gas inclusions which eventually resulted in fractures. Recently Bhilai has commissioned equipment to produce rails with much fewer gas inclusions and has also set up equipment for thorough ultrasonic inspection at the plant. To ensure rigorous implementation of specific issues **we recommend that a group headed by a senior administrative grade IR officer of impeccable credentials take over inspection and certification of quality.**

2.20.3 IR has a large number of rail/weld fractures of which some result in derailments. These fractures are in spite of check by a large number of manually propelled visual ultrasonic testers utilised by IR. In the present USFD testing system which is purely visual (on a screen), about 5 to 10 percent of the rail defects and 10 to 20 percent of the weld defects are missed.

2.20.4 The equipment for ultrasonic testing of rail/weld as also the procedure need considerable improvement. Specifications of equipment, its frequent testing/calibration and analysis of records (the present equipment has no recording device) need to be developed. The situation is particularly bad in regard to inspection of welds as additional special features such as holes, change of metal structure, extra metal around the weld, etc., require special measures to locate defects.

2.20.5 The Sikri Committee had taken cognizance of the insufficiency of visual rail testers and

recommended provision of recorders. However, the design of the ultrasonic equipment has not undergone much change nor have recorders been provided.

2.20.6 IR has set up a Working Group to revise the manual of ultrasonic testing of rail/weld including development of a new testing procedure, different equipment and analysis of results. It is understood that some experts outside the Railways are also being associated with this work. The Committee recommends.

(i) The Working Group set up by Railways to revise manual for USFD testing of rails/welds, supported by eminent outside experts, should complete its work in six months including development of new procedure and prototype equipment which should not necessitate traffic blocks.

(ii) (ii)Thereafter new USFD equipment should be procured having a computerised recording device to enable exhaustive analysis of defects and to identify those which are growing in size.

(iii) The "need based" concept of USFD testing of rails/welds should be implemented straightaway as a parallel action to the development of new equipment/procedure.

(iv) A modern recording car based USFD rail/weld check system along the lines of German Railways should be adopted as soon as possible. It is understood that test

cars already available with the RDSO could be suitably re-equipped.

2.20.7 A number of rail/weld fractures are caused by over-loading wagons and hammerblow due to wheel flats. To overcome this the Committee recommends that:

(i) In-motion weigh bridges should be installed and stringent punishment meted out for over-loading.

(ii) Brake gear should be improved to prevent generation of wheel flats.

2.20.8 Thermit welding is carried out in the field (others are in a workshop) and suffers from poor workmanship. Often these welds are completed in a hurry due to short line occupations and sometimes a train is allowed to pass over these without sufficient cooling. While the rules, if followed, would result in a good weld, its strength would still not be equal to that of rail due to older technology During the Committee's tour abroad, railways in Germany and UK mentioned that they were able to attain the strength of the rail in their Thermit welds.

The Committee recommends that:

(i) IR should within one year obtain the latest technology of THERMIT welding and procure state-of-the-art equipment for testing each THERMIT weld.

(ii) Railways should set up a Welding School close to RDSO, Lucknow, along the lines of German Railways. This institution should cover all aspects such as training, licencing

staff, testing equipment, technology transfer, etc.

2.20.9 In addition to metal defects in rail and welds, high stress in LWR leads to a condition in which many more fractures occur. For this reason destressing of LWR is important. Present maintenance of LWR on IR has not been very satisfactory **The Committee recommends that:**

(i) Record should be kept of all fracture gaps and cuts in LWR along with rail temperature. From this the maximum stress occuring in the LWR should be computed and appropriate action taken.

(ii) Record of behaviour of LWRs should be maintained along the same lines as for bridges with checks at several levels with necessary certification.

2.21 Maintenance of Assets

2.21.1 One of the most disturbing and unhealthy features of the Railways. which has plagued almost every sphere of working and has affected safety is the less than satisfactory maintenance of its assets. During our tours we came across numerous examples of bad upkeep and poor workmanship. Our observations, studies and discussions with railwaymen have helped us to diagnose some factors that have, in varying degrees, contributed to this unhappy state of affairs. These are-

(a) want of requisite skills in the workforce.

(b) inadequate infrastructure both in conception and execution.

(c) shortage of material and problems of non-standard and sub-standard material and spares.

(d) "Over stressing" of assets to achieve short-term goals.

2.21.2 Underpinning all these, is the poor work culture that seems to have got hold of the Railways in a vice-like grip; an ethos that takes no pride in doing a job well, but is only interested in getting by with a minimal contribution. Acceptance of mediocre quality has become routine.

2.21.3 Primarily, this situation has come about as the Railways went on cutting the budget for preventive maintenance and renewal of assets in real terms For many years, the effort has been to impose arbitrary cuts so as to hold maintenance expenditure steady even though inflation kept on relentlessly lowering its real value. The wage content of the maintenance expenditure kept on going up and now leaves precious little funds for material.

2.21.4 The problems relating to manpower have been dealt with separately. A pivotal prerequisite for safety is a well maintained robust infrastructure, a fundamental dictum to which the IR has to give priority. The Committee would like to underline the prime importance of having in place the appropriate infrastructure and its preventive maintenance. Even the most skilled and efficient manpower can achieve very little if the infrastructure is deficient. In depositions before the Committee, the Railway managers, the representatives of Railway Unions and even the ordinary railway workers, almost

without exception, bemoaned the poor state of the maintenance infrastructure. We have earlier referred to the Railways' failure to provide adequate funds to replace its overaged assets but what we see on the railways today is a system operating with a substantial chunk of overaged assets as also a maintenance infrastructure that inadequate and is poorly maintained which is shortening the life of the assets.

2.21.5 From the inventory of shortcomings, the Committee has identified what it considers to be the most critical deficiencies that are very adversely affecting safety on the Railways. These are: -

(a) Inadequate facilities for maintenance of passenger carrying trains: Most of the Zonal Railways mentioned a host of deficiencies in the existing coaching depots. On Eastern Railway at Tikiapara, only 66 percent of the passenger rakes earmarked for primary maintenance were being given pit examination. On some Zonal Railways, due to shortage of pit lines, the effective time available for examination of rakes was less than four hours against the prescribed minimum of six hours. There were complaints regarding poor or no lighting, poor drainage, non-availability of catwalks, etc. The Committee visited a number of coaching depots on the different Zonal Railways but could not locate a single depot which had satisfactory facilities for coaching maintenance. **The Committee is of the view that the inadequate infrastructure at**

coaching depots poses a grave safety hazard. We recommend that.

(i) Adequate and standard maintenance facilities should be provided at all coaching depots on high priority.

(ii) A task force should be appointed to identify the shortcomings, work out the investment required and produce a time bound plan within a period of six months.

In spite of the above position vis à vis the maintenance facilities, which has been in existence since long, the Committee observed that year after year, IR has been introducing a large number of new passenger trains and augmenting load of existing trains. At the same time, the maintenance facilities have not kept pace with the workload. Thus the gap between the required and the existing facilities has widened which is not at all conducive for safety and is now reaching a dangerous level. The Committee, therefore, **recommends that no new train should be introduced till the concerned Commissioner of Railway Safety has certified the adequacy of maintenance infrastructure and manpower.**

(b) Inadequate infrastructure for freight train examination: The Zonal Railways, without exception, have stated that the facilities and infrastructure for freight train examination were inadequate. Our field visits confirm this general view. The examination points were deficient in

the basic facilities such as lighting, pathways, welding and testing facilities, etc. The existing freight yards were constructed many decades ago when there was no concept of executing repair along with train examination. This is a comparatively recent phenomenon. Earlier almost all repairs to wagons were done only on the sick lines and therefore, the provision of elaborate train examination and repair facilities was not a priority item in the planning and design of yards. Moreover, in the past the freight trains were examined after every 400 to 600 Kms. With end-to-end running and the introduction of closed circuit (CC) rakes, the quality of train examination has assumed much greater importance. **The Committee recommends that the Railway management should immediately work towards upgrading the facilities at all major freight train examination points. Railways must identify the shortcomings and draw up a time bound plan for upgradation within six months.**

2.22 Track Maintenance System

2.22.1 Traditionally IR used wooden, cast iron and steel sleepers along with medium weight rails. With manifold increase in traffic, heavier wagons, some augmentation in speeds, disappearance of wood, costlier iron and steel, and rapid change in technology, the track structure changed to concrete sleeper, heavier rail of higher strength and long welded rail (LWR).

2.22.2 The track maintenance method also had to change to take account of the brittleness of the concrete sleeper, the much heavier track frame and compulsions of the LWR. All maintenance operations had to be mechanical with the help of large on-track machines which require line occupation.

2.22.3 The Committee recommends that on routes where mechanized maintenance has been introduced, adequate blocks - preferably of the duration of 4 hours should be given. During these blocks several departments should co-ordinate and take up works concerning OHE, signalling, etc., besides the track maintenance.

2.22.4 The Railways are still in the transition stage of switching maintenance from manual to mechanized. The culture of machines has still to be imbibed Though track maintenance machines have been procured, facilities for their upkeep are not adequate **We recommend that adequate preventive maintenance facilities for track machines be set up within the next 3 years.**

2.22.5 Many attempts have been made to fully mechanize complete sub- divisions so as to develop a standard to go by. Most of the knowledge has now been acquired. **We recommend that IR should progressively switch over to mobile maintenance units on the lines of Konkan Railway with self-propelled rail vehicles, off track tampers (for spot attention) and other equipment instead of conventional P-way gangs, which should cover the 'A' route in the next 5 years.**

2.22.6 Presently the condition of the elastic fastening system on concrete sleepers is generally poor. **IR should introduce cyclic maintenance and periodical renewal of the elastic fastening system of concrete sleepers to reduce the problems being faced in maintenance of LWR.** This will require a quantum jump in procurement of elastic clips, resilient pads and toe load testing devices.

2.23 Ballasting of Track

2.23.1 The importance of track ballast is well known. It distributes load on to soil, provides elasticity, prevents lateral misalignment/buckling and enables correction of geometry. Inelastic track raises impact factor, shortens life of components and damages rolling stock due to hard running/vibrations.

2.23.2 With modern track structure i.e. heavy brittle concrete sleeper, heavier rail laid as LWR and elastic fastenings, adequate quantity and quality of ballast has become a safety pre-requisite. In addition, at least a 150 mm deep ballast bed immediately below the concrete sleeper, has to be free of contamination as the mechanized maintenance now in vogue necessarily involves vibratory tamping/stabilizing.

2.23.3 Zonal Railways have reported a shortage of 15 to 35 percent ballast with 20 to 50 percent contaminated ballast. The yearly loss of ballast due to attrition, weathering, sinkage, etc. is of the order of 5 to 10 percent depending on the quality of stone, density of traffic and the frequency of tamping/screening.

2.23.4 Much of the ballast now being procured is of relatively soft stone which has a shorter life. Hard ballast has 5 to 10 times more life and also reduces maintenance costs considerably. For this reason, all over the world hard stone is preferred even if it has to be brought from long distances at greater cost.

2.23.5 We recommend that Railways should:

(i) make a precise assessment of the ballast shortage and plan to clear the arrears in 5 years along with yearly accrual.

(ii) immediately raise or partially screen stretches of track with contaminated ballast to provide a clean top layer as an interim measure pending final attention.

(iii) introduce a system of track gangs providing cross drains in alternate cribs filled with clean ballast along with cess cutting to prevent water logging.

(iv) develop major sources of hard ballast and curtail procurement of soft stone in the next 5 years.

2.23.6 An issue associated with ballasting relates to the arrangements for movement and unloading of ballast. In a situation where it is becoming difficult to provide adequate blocks for maintenance due to pressures of traffic, the Committee finds that the lower priority given by the Railways to provide the appropriate type of hopper wagons in sufficient number is counterproductive The present practice of supplying condemned BOX and KC wagons for ballast only serves to make the movement and ballast operations more inefficient and time

consuming. **We would urge the Railways to make an assessment of the total hopper wagon requirement and ensure that required numbers are provided to the Zonal Railways in the next three years.**

2.15 Peripheral Activities

2.24.1 An issue not entirely within the control of the Railway management but which has and continues to gnaw away relentlessly at railway resources in terms of manpower and money is the quite staggering scale of ceremonial, Inaugural and other celebratory functions held on the Railways. A number of Railway officials at various levels represented to the Committee that an unacceptable amount of time and money is being spent by the Railways on peripheral matters unconnected with running trains. Key functionaries who are directly connected with safety such as the General Managers (GMS), Divisional Railway Managers (DRMS) and scores of officials from the Civil Engineering, Signal & Telecommunication and Electrical Departments are expending a great deal of time, energy and railway resources on inaugurations, foundation stone-laying. flagging-off ceremonies, felicitation functions, etc. Much of the top Railway executives' time is frittered away on these peripheral activities and they have little time left for the Railways' main job, Le, train running. The enormity of the problem can be gauged from the fact that every year there are scores of functions required to be attended even by the highest levels. When one considers that numerous other functions

are also held at lower levels, then the colossal waste of time and resources on such activities can well be imagined. While this may now be an integral part of the Railway ethos and culture, the Railways can ill afford such distractions. Every function deflects resources and manpower from essential safety related tasks. **The Committee recommends that the Ministry of Railways should, as a mark of respect to the dead and injured in various train accidents, announce an immediate and complete moratorium on all types of celebratory and ceremonial functions for at least the next three years and dedicate this period whole-heartedly and completely to improving safety on the Railways.**

2.25 Departmentalism

2.25.1 Nobody will argue with the thesis that an organization's health and safety depend greatly on a robust and harmonious relationship among the different departments that together make up the whole. Conversely, nothing can be more debilitating than internecine feuds and hostility between departments. A large number of railwaymen, past and present, represented to the Committee that an issue that has very adversely affected the safety environment is the deep "departmentalism" on the railways. Departmental bias has grown such deep and poisonous roots that it would not be an exaggeration to state that today many managers on the IR are not willing to think beyond the interests of their own departments.

2.25.2 Nowhere is this unhealthy mind set more blatantly on display than during accident inquiries. Instead of getting to the root of the problem that caused the accident so that the system can be improved, the majority of officials who make up the inquiry committee have a single mission to ensure that their respective departments are not held responsible for the accident. It is almost universally acknowledged by railwaymen that as a consequence of such narrow departmentalism, in a number of accidents the real cause never comes to light.

2.25.3 The top railway management is aware of the need to restructure the organization. In 1992 the Tandon Committee had been set up to study this problem and submitted its report, but so far nothing has come out. We are aware that breaking the stranglehold of this "departmentalism" is a great challenge for the railway management, but we are also convinced that this problem is so grave and organizationally damaging that it must be addressed without further delay.

The Committee recommends that the Ministry of Railways should immediately engage a management Consultant of international repute who should study this in depth and other managerial issues along with a panel of carefully selected railwaymen.

2.25.4 Other organizational issues that should be referred to the Consultant are: -

(i) provision of at least three years' tenure in senior positions,

(ii) amalgamation of departments on functional basis,

(iii) formation of a management cadre.

We shall cover these issues in some detail in the Final Report.

2.26 A Corporate Safety Plan

2.26.1 The dichotomy between the rules and actual practice, the frequent resort to expediency in the spheres of operation and maintenance, are the inevitable consequence of the absence of a corporate safety plan on the IR. The subject of safety gains special importance only when there is a major catastrophe Then there follows a flurry of safety drives, stern exhortations about the primacy of safety and threats of disciplinary action against officials down the line. This is followed by a facile return to the normal safety environment that the Railways are familiar with.

2.26.2 There is nothing like a safety policy document on the Railways spelling out the safety objectives and the plans for achieving them. There has been no attempt by the Railway management to produce a blueprint on safety clearly defining the priorities so that the vital requirements of safety are not lost sight of under any circumstance. The Railways' fragmentary approach has resulted in ad-hoc safety strategies which have inevitably followed in the wake of major catastrophes and are focussed essentially on the failures highlighted by the particular mishaps. The Ferozabad tragedy woke the Railways to the imperatives of track circuiting and more recently, the accident at Khanna jolted

management into focussing on the problems of ultrasonic testing of rails. This is despite the fact that long back the Kunzru and Wanchoo Committees had attached considerable importance to both these issues.

2.26.3 To help reorient the top Railway management's outlook on safety, there is urgent need for a clear and unambiguous enunciation of the basic tenets and requirements of safety. This will help ensure that IR's decision-making, during their annual investment planning deliberations, does not lose sight of the high priority to be given to safety. In fact it is important that all investment decisions, apart from other considerations, take into account the aspect of safety.

2.26.4 At present safety is clubbed with the signalling Plan head in the Railways' Annual Plan. This gives an incorrect appreciation of investment in safety. For instance, if money under this head is increased by 100 percent while money under other safety related plan heads like track, bridges, rolling stock, etc., is reduced substantially, the impression given to the general public is of adequate concern for safety whereas the actual position is quite the contrary. Unless planning for safety includes in its ambit all crucial related spheres, the approach can, at best, be described as fragmentary. We would like to conclude Chapter II with the recommendation that the Railways should immediately make out 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) prioritize the safety related works and indicate the timeframe as also investments proposed; and

(iv) set benchmarks for safety achievements.

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DEPARTMENT-SPECIFIC SAFETY ISSUES

(CHAPTER: III / THE RAILWAY SAFETY REVIEW COMMITTEE, 1998: H. R. KHANNA COMMITTEE REPORT 1998)

3

3.1 Safety is impacted by almost every sphere of Railway working, although some factors have a much greater and more direct bearing on safety than others. Because of the vast and all-pervasive reach of safety, our committee has necessarily been selective in choosing the areas of safety to be highlighted. We have, in Chapter II, concentrated on issues irrespective of departments that we consider to have a deep and enduring influence on safety and the implementation of which is urgent. While the dominant themes of safety have been covered in the earlier chapter, now we focus on some of the other important but department specific issues concerning safety.

3.2 Staff and General Matters

Unions

3.2.1 Supervisors as Members of Unions

The Kunzru, Wanchoo and Sikri Committees were emphatic that supervisors, who are the real cutting-edge of management, should be debarred from joining Unions. The rationale given was that with two

recognized Unions on the Railways, a supervisor belonging to one Union becomes suspect in the eyes of staff belonging to the rival Union, and this partisanship, whether perceived or real, erodes his moral authority and vitiates the work environment. The management of the Zonal Railways, with one exception, also endorsed the view that supervisors should not be allowed to join unions. We received feed-back from a cross-section of Railway managers in the field that supervisors with union membership not only carried the stigma of partisanship, but were also guilty of allowing union responsibilities to deflect them from their legitimate professional duties, resulting in all-round dilution of work standards.

3.2.2 The recommendation of the three earlier Accident Inquiry Committees of barring Supervisors from joining unions was not accepted by the Government on the plea that it would not be possible to amend the Trade Union Act

3.2.3 This issue was discussed at length by this Committee. The fact that past Committees, consisting of legal luminaries and constitutional experts, reiterated the recommendation in-spite of the Government's view, is definitive proof that the practicality and legal implications of implementing the recommendation had been carefully studied. The present Committee includes not only a jurist of considerable experience but also other persons with legislative experience as well as officers who have served Indian Railways in high positions. We also strongly endorse and repeat the recommendation **that supervisors should not be allowed to join the unions** for reasons given by the

Group on Railway Safety in January 1996, which are reproduced below: -

(i) Senior supervisors are the persons on the spot. They represent the Railway administration in the field. In case they become members of trade unions, they tend to overlook the failure of workers.

(ii) It is observed that when senior supervisors become office bearers of a union, a significant share of their time and energy is taken up by union activity and their efficiency is reduced.

(iii) Once they become office bearers or active union members, they no longer remain impartial to staff under their control, but allow union affiliations to determine their attitude.

(iv) As office bearers of unions, their continuance depends upon support from staff. Supervisors, therefore, hesitate to take up with defaulting workers because they need support from them.

(v) Experience shows that senior supervisors as office bearers or active members of unions have often failed to discharge their duties efficiently and also compromised their professional integrity on union considerations

3.2.4 The supervisors should, however, be permitted to form their own association to represent their interests and grievances. The right represent grievances by the supervisors is, therefore, not being denied, only the channel is proposed to be different. We are of the view that it should be possible to amend the relevant law in respect of Railways only, to implement this recommendation. The Committee feels

that this recommendation will not lead to a vacuum in union leadership.

3.2.5 Transfer of Union Officials

It is well established that transfers are an important tool not only for building up the experience and versatility of Railwaymen but also for dealing with the common problems associated with long tenures. We, however, find that Railway management seems to be extremely ambivalent on the subject of transfer of union officials. According to the extant instructions, if a trade union official is to be transferred from one station to another, the proposal should be forwarded to the union, and in case there is no agreement on the issue, the case is sent to the General Manager for a decision. Even if the GM endorses the transfer, the instructions are that the transfer is to be allowed to pend till the next election of the union bearers, subject to a maximum period of one year. We were informed by a number of Railway managers, that as a result of the involved instructions, it is well nigh impossible to effect the transfer of trade union officials. As transfers are necessary in the interest of efficient management, we recommend that **in the case of transfers of union officials, it should be sufficient to give the trade unions a notice of 3 months, to enable alternative arrangements being made. The transfer should have the approval of an officer one level higher than the one ordinarily competent to order the transfer.**

3.3 Simplification of Rules

3.3.1 General Rules for Indian Railways, which is the Railwayman's basic guide on railway working, spell

out the essential rules and procedures for operating the railway system. First adopted in 1906, it was last revised in 1976. In the twenty odd years since then, several changes in the operating systems and pattern of working have occurred due to modernization and technology upgradation but this has not been matched by commensurate updating of the rules. Several Railways represented to the Committee that:

(i) the rule books are couched in legalese making them difficult to comprehend.
(ii) many of the extant rules have become outdated,
(iii) there are rules still in place that bear no semblance to the facts on the ground.
(iv) there are rules which are not practical and are seldom followed.

3.3.2 Many General Rules have correction slips which indicate that the rules need updating.

Besides the General Rules, some of the other rule books/manuals also need modification. **We recommend that the General Rules 1978 as also other manuals should be revised and updated as necessary.** These rules should be framed in simple, clear language

3.3.3 On the subject of rules, we further recommend:

(i) that all manuals containing rules for the different categories of staff associated with safety should be available in the vernacular languages, apart from Hindi and English, but as separate books.
(ii) that each correction slip should be issued after incorporation in a replacement page instead of the

untidy, book-marker type correction slips currently in vogue.

(iii) that a comprehensive Accident Manual applicable to the Indian Railways should be framed. This should include all aspects of disaster management.

3.3.4 An aspect of Railway working that needs to be examined de-novo is the total lack of uniformity in the type of forms and authority documents used by the different Railways for similar train running situations and activities. **We recommend that the Railways should immediately work towards ensuring uniformity in the types of authority and procedural forms issued in day-to-day train working.** We are unable to understand why a unified Railway system of over 50 years vintage should cling to forms or procedures handed down by the Company Railways prior to Independence.

3.4 Empowerment of Supervisors/Inspectors

3.4.1 As far back as 1962, the Kunzru Committee referred to the need to “restore the prestige of the supervisor in the eyes of the staff whom he supervises," so as to enhance his effectiveness. And yet more than three decades later, in evidence tendered before us, the recurring complaint of Railway managers was that supervisors and inspectors have become totally ineffective. According to many in the Railway administration, the dilution in the supervisory and inspectorial cadre has done considerable damage to the Railways. Many of us who have seen the Railways at close quarters, also subscribe to the view that this is a grave problem which, if unattended, can cause

incalculable harm to the productivity and health of the organization.

3.4.2 Restoring the authority and prestige of supervisors and inspectors is a formidable challenge for the Railways. We are aware that the effectiveness of a supervisor depends greatly on the caliber of the individual, the confidence that he enjoys of the administration and the support that it gives him, for which there are no easy prescriptions. We, however, feel that in order to improve the self-esteem of supervisors, and raise their stature, the Railway administration should empower them with increased Disciplinary and Appeal as also financial powers. **To this end we recommend the following:**

(i) Supervisors in scale Rs.6500-10500/- who exercise establishment powers should have most of the disciplinary powers which are at present with Junior Scale Officers.

(ii) Because of their position in the hierarchy and nature of their duties involving supervision of senior ranking Class III employees, the posts of the LIs and TIs should only be in the two highest supervisory grades viz. Rs.6500-10500/- and Rs.7450- 11500/-.

(iii) Supervisors should be given the powers to grant on-the-spot cash awards up to a maximum of Rs.100/- to staff under their control subject to a maximum of Rs.2000/- per year.

3.5 Quality of Inspections

3.5.1 In 1998-99, the total number of inspections conducted by the officers and supervisors of the Safety

Organization of IR alone were around three lakhs which included footplate and brake-van inspections, ambush checks, station and level crossing inspections as also checks of running rooms and lobbies. Add to this the safety related inspections conducted by officers and staff of other departments; one would have a figure of safety inspections manifold higher. In addition, there are inspections unconnected with safety like commercial, accounts, etc. It would thus appear that if monitoring on the Railways is to be judged by the sheer number of inspections carried out by the different functionaries, then the IR would qualify as one of the world's most monitored outfits. The tragedy, however, of the IR, as brought out in the evidence tendered before us, was that quite often the inspections were more form than substance. The impression that we arrived at on the basis of our observations and discussions was that, by and large, the inspections were performed mainly to fulfill the prescribed quotas, and not focussed on correction and education of the staff. Even in cases where aberrations in the working are noticed, the inspecting officials do not follow up to ensure rectification. Greater clarity is needed in linking accountability to specific duties of individuals. For instance a P-way inspector is finally accountable for detection and removal of track defects. The Assistant Engineer supervising the PWI should be accountable to ensure that the PWI is performing his job satisfactorily. Higher levels must ensure adequacy of systems and their satisfactory functioning by proper monitoring. Divisional officers were almost unanimous in their complaint about the much too frequent

visits/inspections of Zonal headquarter officers to the Divisions, which diverted attention from the important day-to-day work of the Divisional officers. Such an attitude only emphasized the fact that the high volume of inspections, instead of being an important tool of constructive working, was perceived to be a waste of time and resources. This is a serious matter which must receive the immediate attention of the top Railway management. Our recommendations in this regard are as under: -

(i) For the guidance of the inspecting officials, detailed check-lists for various types of inspections need to be made out. Some Railway Zones have already done work in this regard which need to be emulated by others.

(ii) Every item contained in the check list is required to be covered after a specified period by designated levels and a record maintained of each item. Subsequent inspections should target rectification of shortcomings noticed earlier, maintaining necessary records.

(iii) Apart from these detailed inspections, other field visits of the inspecting officials should be focussed on random check of some items out of the checklist, in addition to analysis of action taken on previously noticed shortcomings.

(iv) Periodically, each department should undertake Safety Audits which should be conducted by a special team reporting to the PHOD/DRM.

3.5.2 Railway staff are overburdened with a large number of casual inspections which should be considerably curtailed. It should be the task of the PHOD to specify

the number and content of inspections that each level should carry out Unlike the present approach, senior levels should restrict themselves to bigger Issues like strategic planning, policy making, problem solving, grievances, monitoring etc. rather than making frequent forays into the field. Rather, they should be available for consultation by colleagues and others at junior levels. **The number of inspections to be conducted by an individual should be inversely proportionate to his position in the hierarchy.**

3.6 Neutral Control Organization

3.6.1 The Neutral Control Organization is an independent authority under the IRCA and neutral TXRs are posted to workshops, ROH depots and some major sick lines. In addition, there are also some flying squads for conducting surprise test checks. While once this organization was very effective, the general feeling is that they have now lost their teeth and their quality audit has become a mere formality Rolling stock rejected by them on safety considerations, is generally passed by the local officers without examining the grave implications to safety.

3.6.2 The Committee examined this issue in detail. In the IRCA's quarterly report on the Neutral Control Organization for the period ending June, 1998, while the rejections for coaching stock in the workshops as a percentage were very high (12 BG workshops out of 21 had rejections between 70 and 99.7 percent), it was noted that the bulk of them were on account of non-availability of material, mainly for certain modifications to be carried out on the rolling stock. The rejections on account of safety defects were few,

again the bulk being on account of non-availability of material. The disturbing feature was that most of the rolling stock was turned out from the workshop under local authority without attending to the defects.

3.6.3 The Committee strongly feels that the NCO should be taken very seriously. It is recommended **that the Mechanical Directorate should clearly spell out those defects which have serious implications for safety, and if any rolling stock is rejected by the NTXR on account of such a defect, such stock shall not be turned out from the workshops without rectification**. The Committee also recommends that **in the event of rolling stock being rejected on account of non-availability of material, the concerned stores officers should put up explanation for the failure to the administration.**

3.7 Permanent Way

3.7.1 Derailments constitute about 90 per cent of the total accidents (reported and unreported) on IR. Permanent Way by itself and in combination with other factors accounts for about half the train derailments, thereby making it the most critical determinant of safety. Statistics clearly demonstrate that safety on the Railways depends to a great extent on how efficiently the track withstands the pressures of the trains running over it. With burgeoning traffic, increasingly higher speeds and preponderance of wagons with heavier axle loads, this component of the infrastructure is being subjected to the most severe pounding, especially the BG network which constitutes 69 percent of the total route Kms but handles 98 percent of the freight output (net tonne kms) and 91 percent of

the passenger output (passenger kms). The pressures on track are further exacerbated by wheel flats, overloaded wagons, under-powered trains etc. Considering its vital position in the railway system, we have made a detailed study of the different aspects of track that infringe on safety, from procurement of track components and construction to maintenance practices and the human factor. This has involved critical evaluation of track structure and geometry, modernization in the context of emerging new technologies as also an appraisal of the quite formidable maintenance and human resource problems. Some of the vital issues on this subject relating to track renewals, distressed bridges, ballasting and ultrasonic testing of rails have been covered in Chapter II.

3.7.2 As rail is the most critical component of safety, we believe that any relaxation in quality allowed to a manufacturer of rail directly hurts safety. **We recommend that UIC specifications universally used by developed countries should be adopted by IR. This will ensure that:**

(i) No rail is laid in track until it is cleared by USFD at the manufacturing plant.

(ii) The hydrogen content is 3 PPM and under.

(iii) The rail is end-straightened at the steel plant and ready for welding.

(iv) No rail is accepted until it is tested by eddy current for detection of sub- surface and surface defects.

3.8 Staff and General Matters

3.8.1 Track maintenance on IR is a mix of the age-old

manual techniques using crowbars, beaters, and shovels, as also the latest hi-tech mechanized methods The last two decades have seen considerable modernization in the form of long- welded rails, concrete sleepers and machine maintenance. We have made a critical study of maintenance issues in the context of modernization and arrived at the following conclusions: -

(i) It has been well established that gauge-face lubrication not only enhances the life of rails/turn-outs and saves fuel but also reduces the chances of derailment. **We recommend lubrication of gauge-face on curves, points and crossings, weak track, track work sites, and on bad formations, as these are locations where wheel-mounting derailments occur. The lubrication should be done once a day with a simple hand carried machine.**

(ii) A major reason for many rail weld fractures is the misbehaviour of long welded rail (LWR) which results in very high thermal stresses. The consequence of such stresses is track buckling or fracture This potentially dangerous phenomenon occurs due to insufficient toe load of the ER clips and failure to destress LWR at correct temperatures. To overcome these problems, a new fastening system needs to be evolved. **We recommend that regular periodic measurement of toe-load of the fastening should be taken systematically so that bad stretches requiring out-of-turn attention can be quickly identified and rectified**.

(iii) Indian Railways should procure laser-based track recording cars that will measure track geometry with precision and accuracy at reasonably high speeds. A track recording car in Germany measures track geometry at 100 kmph and prints out a record of the defects with pin-point precision that can be given to the maintenance units for immediate correction.

(iv) **Reliable communication should be available between the engineering worksite and the station staff on either side of the work spot.**

3.9 Staff and General Matters

3.9.1 Along with track, rolling stock constitutes the basic hardware of the Railways. Safety of the railway system depends as much on the quality and upkeep of rolling stock as it does on the track standards. Judged in terms of its negative implications on safety, rolling stock accounts for about 25 percent of the train accidents on IR. It was, therefore, only appropriate that a prime focus of our investigations into safety on IR should be on this critical component. We have already covered some of the safety-related aspects of rolling stock such as overaged stock and maintenance facilities in Chapter II. But there are some other important issues relating to rolling stock having a direct bearing on safety which we highlight in this section.

3.10 Staff and General Matters

3.10.1 The number of accidents caused by locomotives have been minimal - only 33 accidents attributed to defects in locomotives in the last 10 years. Nevertheless, on the basis of our discussions and

observations in the field, we have arrived at certain recommendations relating to locomotives which should enhance safety in train operations.

3.10.2 In recent times, major catastrophes have taken place on account of derailment of a train resulting in infringement of the adjoining track leading to a collision with a train coming from the opposite direction. The time available to the driver of the derailed train to initiate emergency action to warn the oncoming train of a possible danger is extremely short. Often, the concerned train staff are in a state of shock, have insufficient information of the happenings, and therefore take considerable time for carrying out the train protection exercise. To overcome this the Committee recommends **provision of an emergency button suitably located in the driver's cab which, when pressed, will:**

(i) cut off power of the loco.
(ii) put on the flasher lights.
(iii) set off an emergency siren.
(iv) shoot flares in the sky; and
(v) send an SOS signal on the mobile train radio, if available.

3.10.3 The Committee also recommends **that the flasher light on the locomotive should have much better visibility than the existing one.**

3.10.4 Our investigations show that the audio-visual warning system to alert the driver in case of alarm chain pulling in air brake trains has not been fitted on a large number of locos working passenger carrying trains. If the driver does not act when the

alarm chain is pulled, not only does it mean passenger distress not being acknowledged, but it also results in wheel flats which have serious repercussions on the track. Our studies also indicate that the present device for audio visual warning, which is based on air flow, is not reliable. **Considering the critical importance of this device in emergencies involving passenger distress and generation of wheel flats, we feel that the Railways must, without further delay, ensure that the system of through wiring in the coaches to activate this device is restored.** Such an arrangement will have the added advantage of detecting train-parting. The wire running through the length of the train can also be put to other uses such as for driver-guard communication, better braking etc.

3.10.5 Our Committee found that many locomotives even now do not have working speed recorders. **It is imperative that all locomotives, without exception, are provided with reliable speed recorders with digital memory. Micro-processor-based speed recorders should be developed which not only record speed, distance and time, but also activities like brake application, throttle position, use of whistle etc.** Such records will help in accident enquiries.

3.10.6 Sensitive air-brake equipment like distributor valves malfunction on account of moisture in pressurized air supplied by the locomotives. **We recommend that air driers should be fitted on all existing and new diesel/electric locomotives.**

3.11 Coaching and Goods stock

3.11.1 Our analysis of train accidents on carriage and wagon account in the 10- year period between 1988-89 and 1997-98 shows that there were 408 accidents on C&W account in the 5-year block between 1988-89 and 1992-93. In the 5-year block from 1992-93 to 1997-98, the number was 329.

3.11.2 We have already emphasized in Chapter II the critical importance of completely revamping and upgrading the coach and wagon maintenance infrastructure as the present inadequate arrangements militate against quality work. The general condition of the examination pits and lines is not up to the mark and as such, proper examination is not possible.

3.11.3 Poor design of the bogie of coaching stock and inferior, and substandard spares have also compromised safety. With regard to bogie design, our analysis reveals that there are certain components which need to be modified on an emergent basis as they are failure-prone. **Our recommendations are as under; -**

(i) A recurring note in many enquiry reports on accidents involving coaches is that the dashpots were found with low oil levels. The design of dashpots is defective and oil retention for the stipulated period cannot be ensured. Considerable work for elimination of dashpots has already been done and replacement by hydraulic shock absorbers, rubber rolling rings and friction snubbers are on trial. **The Railways must immediately**

research an alternative to dashpots and install it in three years.

(ii) All new coaches must be fitted with bogie-mounted brakes and retrofitment on existing fleet should be completed in five years.

(iii) (iii) Fitment of air springs should be statutory for EMU stock and this should be completed in five years. The Railways should also examine the possibility of fitting them on other coaching stock.

(iv) We find that the quality of safety-rubber fittings required for rolling stock and permanent way is suspect. Sample checks have not helped in ensuring quality. **Considering their crucial implications, the critical rubber components should be manufactured by the Railways in- house, by developing the required wherewithal, in some of the Railways' existing manufacturing units.**

3.11.4 With regard to goods stock, the following design changes are recommended: -

(i) Although the casnub bogie fitted on air-braked stock has performed well and contained axle and spring breakages, the heavy flange forces have resulted in premature wheel wear. At Mughalsarai alone, the wheels on around 4500 wagons not due ROH or POH are changed every year due to premature wear. **We recommend that the Railways should**

quickly switch over to self-steering bogies which reduce wheel flange wear besides exerting very low flange forces on the track.

(ii) The existing body of the wagons is highly susceptible to corrosion. **The Railways should introduce ferritic stainless steel on the open wagons to reduce corrosion.**

(iii) 'F' type couplers, which are robust, have little wear and reduce chances of uncoupling in accidents, should be introduced early.

(iv) Composite brake blocks, which are non-pilferable and can last from ROH to ROH, should be inducted on priority.

(v) The Railways must examine the feasibility of having bogie mounted brakes on wagons, which will reduce brake rigging and associated problems.

3.11 POH of Wagons

3.12.1 The periodical overhaul of wagons is done in workshops at intervals ranging from 4 V2 years to 6 years. Our studies revealed that every workshop is dealing with a large number of wagon types. In this connection, we strongly endorse the recommendation made in the RITES report, "Optimized Maintenance of wagons on Indian Railways" **that the POH load to the different workshops should be distributed in a manner that one shop handles only one or, at best, two**

types of wagons. This will ensure better skills among the workforce through specialization, fewer problems with material availability, reduced inventory and easier identification of poor workmanship.

3.13 Pattern of Train Examination

3.13.1 A fundamental requirement of safety in train operation is thorough examination of trains after prescribed service. During the course of our discussions with railway officials we found that instructions regarding pattern of freight train examination in respect of UIC vacuum braked stock are not clear. **We recommend that the Railway Board should immediately issue uniform guidelines for freight train examination that should be jointly endorsed by the Mechanical and Traffic Directorates of the Railway Board.**

3.14 Pressure Gauges in Brake Van

3.14.1 The Committee observes that availability of pressure gauges in Brake Vans of freight trains is a rarity. This is because at present every time a guard is changed, the TXR is supposed to fit the gauge available in the guard's kit. This is hardly ever done as Guards rarely have pressure gauges and even if they do, the TXR never bothers. More than 3 years back, Railway Board ordered installation of a system of fitment of pressure gauges with 'Quick Couplings' which enabled guards to fit pressure gauges themselves. Unfortunately, this system has still not been implemented. Non-availability of a pressure gauge in the Brake Van is a safety hazard

and accidents have been caused on this account. **The Committee recommends that the arrangement of fitting pressure gauges with "Quick Coupling" arrangement in Brake Vans should be implemented within one year. No train should be allowed to operate without pressure gauges,**

3.15 Closed Circuit Rakes

3.15.1 In a presentation made to the Committee, the management of South-Eastern Railway provided a significant statistic regarding the performance of CC rakes. With an average holding of 190 CC rakes, the number of accidents involving CC rakes were 5 in 1997-98. In the same period, the average holding of other rakes was 140, but the accidents involving such rakes totalled 17. The conclusion drawn was that CC rakes were not only more productive but also much safer compared to other types of freight trains. The reasons cited for the superior performance of the closed-circuit rakes over other types were that staff of only one depot handled these rakes, giving the staff a sense of ownership which encouraged them to put in quality work. The CC rakes performed well also because care is taken to ensure that every rake is provided with the full complement of components. The other Zonal Railways were also enthusiastic about the positive gains of running CC rakes. **We would urge the Railway administration to extend the CC concept to new circuits**. We, however, found that sometimes the discipline of logging of the Kms run thereby ensuring timely examination, is not

being maintained. This discipline needs to be enforced.

3.16 Signalling and Telecommunication

3.16.1 There is no doubt that modern signalling promotes safety in rail operation, but such systems are expensive. In Chapter II we have indicated the need to replace the overaged S&T assets, to complete track circuiting, to extend the AWS to the 'C' and 'A' routes and to provide train radio communication within a fixed time frame, as we consider that they belong to the very top rung of S&T aids that will greatly enhance safety on IR. S&T department has to make a major contribution to enhancement of safety by providing aids for prevention of accidents. These will be taken up in our Final Report.

3.17 Block Proving With Axle Counters

3.17.1 Since the Committee has recommended provision of radio communication between guard/driver and ASM on a time bound basis, we feel the duty of reporting complete arrival of the train can be performed by guard and, therefore, there is no need to install axle counters.

3.17.2 In case, however, radio communication is not provided and considering the fact that train partings are still an endemic feature on the Railways, the Committee recommends adoption of block proving with axle counters on a large scale on busy routes. Trials with block proving axle counter which were commenced in the mid-1980s', have now passed the test of reliability. The Committee was informed that block proving with

axle counters has already been provided in 135 block sections and are working satisfactorily. It is unfortunate, though, that the block proving axle counters that have so far been installed, are spread out to various sections, instead of being installed in continuous stretches. In future, such equipment should be installed section-wise, and not in the present random, haphazard manner. The recommended time frame and approximate costs are indicated below;-

Route	Approximate cost	Time frame
'A'	Rs. 115 crores	3 years
'B'	Rs. 112 crores	5 years (after 'A' route)

3.18 Level Crossings

3.18.1 In order to appreciate the challenges faced by the IR in ensuring safety at level crossings, we give below a few key statistics:

- On 1.4.99, IR had a total of 16158 manned and 24513 unmanned level crossings.
- The number of manned gates with "full" protection in the form of interlocking with signals is 5758.
- The number of manned gates provided with telephone are 13,302.

Our analysis of accidents shows:

	Item	**1988-89 to 1992-93**	**1993-94 to 1997-98**
No. of Accidents			
(a)	At Manned Level Crossing	89	92
(b)	At Unmanned Level Crossing Casualties	164	257

Casualties			
(a)	Killed	362	848
(b)	Injured	960	1105
Total Casualties		1322	1953

Our analysis further shows that 90 percent of the level crossing accidents take place in the day time.

3.18.2 Judged in terms of number of level crossing accidents, the safety of the IR is far better than that of even advanced railway systems. For instance, in the two years, 1995 and 1996, there were 154 and 166 level crossing accidents respectively on the French Railways (SNCF), and as many as 231 and 242 level crossing accidents respectively on the German Railways (DB AG). In comparison, on IR there were only 68 level crossing accidents in 1995-96 and 65 level crossing accidents in 1996-97. However, we are of the view that by taking suitable action, the number can be reduced further. Considering the rapidly increasing motorised road traffic in the country and collateral pressures at level crossing gates, we are of the view that the IR would need to address and rectify the present inadequacies in the infrastructure and working of level crossings. With every passing year, the arrangements now in place at LC gates are proving to be increasingly inadequate. A number of shortcomings covering different aspects of LC gate operations have come to our notice. We found that even on the high density double/multiple line routes, there were LC gates provided with gate leaves instead of co-acting lifting barriers. The gate leaves are a definite safety hazard because of the extra time required for closure, and the possibility

of road traffic being trapped within the gates because of non-synchronised closing arrangements, thereby increasing the time required for gate closure and locking. **We recommend that at all noninterlocked manned level crossings on double/multiple lines still having gate leaves, coupled lifting barriers operated from a central location with a suitable locking device should be provided within the next one year.**

3.18.3 A major problem at manned non-interlocked level crossings with telephones relates to the procedures prescribed for exchange of private numbers between the gateman and station staff, which are designed to ensure safety but are unworkable and almost impossible to observe in actual field conditions, as represented to us by railwaymen themselves. To understand the problem, it is necessary to give the comprehensive details of the present system.

3.18.4 The majority of the non-interlocked manned level crossings provided with telephones and situated in the block section, have the normal position of the gates closed/locked to road traffic. According to the rules, at such gates the gateman must first obtain the permission of the SM of the adjoining station under exchange of private numbers before he can open the gate to clear the waiting road traffic. Thereafter, he is required to close the gate and intimate the SM again under exchange of private numbers that he has done so, after which the SM will authorize train movements into the section. The rule is fail-safe but is often not observed. There

have been numerous instances when the SM could not permit the gateman to open gates to avoid detention of train services and when duration of such closures becomes excessive on busy roads, the irate road users force the gateman to open the gate. Another common happening is that the gateman, after obtaining permission to open the gate, does not revert to the SM regarding closure of the gate. In such a situation, the rules prescribe that the SM should issue caution orders to all trains entering that particular block section, but serious accidents have occurred due to caution orders not being issued. Having studied the subject in some depth and on the basis of the suggestions received from the Zonal Railways, **the Committee recommends the following modifications in the working instructions at non-interlocked manned gates having telephone**: -

(i) On sections having up to a total of 80 Up and Down trains per day, the level crossing will have normal position open to road traffic. The SM shall exchange private number with the gateman as assurance of closure of the gate for every train, before authorizing entry of trains into the section. After passage of the train and until intimation of the next train, the gateman can pass the waiting road traffic.

(ii) On sections with over 80 trains per day, the level crossing will have normal position closed to road traffic. The SM need not

exchange private number with the gateman for every train. Whenever the gateman finds it necessary to open the gate for passing road traffic, he shall obtain permission from SM with exchange of private number, pass road traffic with utmost despatch, close the gate and inform the SM accordingly with private number exchange. In order to ensure that SM gives permission at regular intervals for clearing the road traffic, there should be a stipulation that in case of demand, it will be incumbent on the SM to give permission for opening the level crossing gate for 5 minutes after every 30 minutes, if necessary, by train regulation.

3.18.5 The Committee is aware that the recommended change in procedure, though the most practical in the existing working conditions operated with the most rudimentary aids, is far from being a complete solution especially in situations where there is heavy train as well as road traffic. **We urge the Railways to identify and upgrade such gates through inter-locking. The only complete solution is a road over/under bridge. In view of very large expenditure involved this is only possible if a cess is levied on road users through sale of road vehicles/fuel, as was recommended sometime back by Railway Administration.**

3.18.6 For more than three decades, IR has been exploring the possibilities of inducting modern technology for improving safety at level crossings. The Kunzi

Committee (1962) had recommended the adoption of automatic half barriers at level crossings, which was also endorsed by the Wanchoo Committee (1968). In the early 1970s automatic half barriers were installed at a gate at Unnao on Northern Railway, but this was not successful as the road traffic weaved through the closed gates. Another technological innovation for enhancing safety at level crossings, which has remained in the trial mode for almost two decades, is the train actuated warning device (TAWD). Although the TAWD technology is extensively used in other developing/developed countries for several decades, IR is still to agree on a device that suits Indian conditions. In evidence before the Committee, it has been stated that adoption of the technology has been stymied by the failure of industry to develop a failure-proof device with pilfer free features. The Railways is also apprehensive that installation of such a device as protection at unmanned gates, will increase the Railways' liability. But it is obvious that the Railways cannot ensure a satisfactory level of safety at level crossings with the existing primitive aids. Now that different train actuated devices have been developed and tried out, the Railways should take a big stride forward and set in motion the process for ultimately installing this aid at unmanned level crossings as an alternative to manning. **We, therefore, recommend that in the first stage, the Railways should install the TAWD at 100 manned gates not provided with**

telephone within the next one year. If the functioning of the TAWD at these 100 gates is satisfactory from the point of view of providing intimation to the road user in case of equipment failure and is also not prone to theft, these devices should be used as a substitute for manning, and, in stages, extended to cover unmanned level crossing gates in the country. Before the Railways extend installation of this device further, it must be ensured that they are fail-safe and not prone to theft.

3.18.7 There is another problem relating to unmanned gates that came to the notice of the Committee. Even as the road user is invariably blamed for the accidents at unmanned level crossing, we heard evidence that the Railways has not adequately maintained the basic facilities at a large number of gates such as proper road surface, level stretch of road on either side, proper visibility for road users etc. **The Railways should immediately take in hand the issue of providing the basic prescribed infrastructure at unmanned level crossings.**

3.18.8 It came to the notice of the Committee that in accordance with extant instructions, "rumble strips" are provided at the road approach of manned level crossing gates. The Committee is of the view that this is an unnecessary encumbrance and only impedes the smooth flow of road traffic when the gate is open for road traffic. **We recommend that rumble-strips constructed at the approach of manned gates should be removed.**

3.18.9 The gateman is the most critical element for ensuring safety at manned level crossings. The job of the gateman is becoming difficult with every passing year because he has to deal with increasing rail and road traffic without any significant improvements in the aids provided to him. He has to deal with road users who are impatient, intolerant of delays and even ready to use violence to get the gates opened. He has to be literate to handle the cumbersome job of exchanging private numbers. Despite his onerous responsibilities, he is positioned at the bottom of hierarchy, being in the initial grade equal to that of gangman/porter. It was represented to us that on account of the hazards and responsibilities for which there is hardly any matching compensation, the Railways are finding it difficult to get suitable volunteers to work as gatemen. **We recommend that the grade of the gatemen (of Engineering and Traffic) should be raised to that of keyman. We further recommend that the medical category for gatemen should be revised from A3 to B1 to improve availability.**

3.19 Accident Management

3.19.1 As with human beings, the worth of an organization is judged by its response to crisis and disasters. The IR has traditionally attached the highest Importance to providing immediate relief to passengers affected by accidents as also for arranging prompt restoration of traffic over the affected route. Over the years the Railways has evolved a reasonably well-organized machinery for handling accidents

and their immediate aftermath. Accident Relief trains and Medical vans have been positioned at suitable locations right across the railway network to ensure quick rescue and relief at the time of accidents. Specially trained staff Including medical personnel are ever in readiness to rush to the site of accidents. Nevertheless, our Committee is of the view that certain improvements need to be effected not only in the hardware utilised for accident relief and restoration, but also in the management of accidents.

3.19.2 The Committee is of the view that lack of formal training has resulted in ART staff not knowing and making full use of the potential of the equipment available, viz. BD Crane, Hydraulic Rerailing Device and Hydraulic Cold Cutting/Rescue Device. Formal training will also help electrical staff to reduce time required for slewing and restoring the OHE. Engineering staff will perform much better with improved tools and equipment and material handling devices for which they also need formal training.

3.19.3 For all the attention bestowed to accident management, the Railways has in recent years been targetted for criticism by the media for providing inadequate post-accident relief arrangements. Special knowledge and understanding is needed to deal with traumatised passengers and other crucial aspects of post accident management. "Disaster Management" is a very specialised subject, the training for which needs to be handled by experts. **Considering the importance of the subject, we**

recommend that the Railways should set up a Disaster Management Institute that can focus exclusively on training Railwaymen on the various aspects of Disaster Management.

3.19.4 It is unfortunate that there are a large number of medical vans in use which have been fashioned out of overaged stock. As a result, they cannot operate at the normal sectional speed. In view of the paramount importance of rushing medical aid to the scene of a disaster, **we recommend that the Railways should provide self-propelled medical vans in replacement of the existing medical vans within a span of 5 years**. The cost of such replacement would be approximately Rs. 300 crores.

3.19.5 It was brought to the notice of the Committee that many health units of the Railways do not have road ambulances, on account of which the movement of doctors and para military staff to accident sites gets delayed. As the provision of an ambulance would also greatly increase the effectiveness and physical reach of a health unit even in normal conditions, **we recommend that every Railway health unit should be provided with a road ambulance.**

3.19.6 The upgradation of the break-down cranes has not kept pace with the changes in design and weight of rolling stock. The 35 tonne and even 75 tonne cranes available at many locations are inadequate to deal with the new generation wagons such as BOX 'N' and BCN in loaded condition. Railwaymen with vast experience in tackling accident situations emphasised the importance of providing 140 tonne

cranes with the ARTs as the use of these cranes reduced the time required for restoration. **We recommend that production of 140 tonne cranes should be given high priority and the Railways should aim to provide 140 tonne cranes in all the ARTs within the next five years, if necessary by resorting to imports.**

3.19.7 The equipment on ARTs, particularly the crane, hydraulic rerailing equipment and hydraulic cold cutting/rescue device have to be maintained in perfect fettle. But this is actually not so, as we were told - largely on account of non-availability of spares. **We, therefore, recommend that for repair and replacement of parts of equipment in the ARTs, special powers should be delegated to the divisions to procure parts, either directly from the original equipment manufacturer or from an approved agency on rate contract upto Rs.1 lakh per quarter. A special imprest of Rs.25,000/- may also be sanctioned to the officer-incharge of ART for minor repairs of equipment in the relief train.**

3.19.8 The existing BD crane with a fixed jib cannot function effectively in the tunnels and in electrified sections without removal of the OHE. We were told about cranes with horizontal telescopic jibs which are much more effective under such constraints. **We recommend that two horizontal telescopic boom cranes should be provided on the IR for trials.**

3.19.9 At major stations and Railway yards, road vehicles equipped with jacks, hydraulic rerailing

equipment etc should be provided for tackling the minor derailments quickly. Such vehicles will obviate the need to move the cumbersome and expensive ARTs to site for each and every mishap.

3.20 Compensation for Passengers involved in train accidents

3.20.1 The Report of the "Group on Railway Safety (1996)" contains several important suggestions for quick finalisation of compensation to passengers involved in train accidents. Considering the number of complaints received by our Committee regarding inordinate delays in settlement of such claims, it would appear that the recommendations of the "Group on Railway Safety" remain largely unimplemented. Some shortcomings in the existing system that have come to our notice are indicated below along with our suggestions thereon.

3.20.2 Although there is a provision for transfer of a claims application from one RCT branch to another at the convenience of the applicant, the existing rules stipulate that the applicant should apply to the Chairman, RCT, Delhi, who may then direct a Bench other than the nominated Bench to hear such application. Instead of this cumbersome procedure, **we recommend that the jurisdiction clause of the RCT Act should be suitably amended so that the applicant can file the case in any RCT Bench.**

3.20.3 At present there is a ceiling of Rs. 10,000/- for deciding a case by one Member of the Tribunal. It is not uncommon that due to vacancies only one Member of the Tribunal is available for deciding compensation cases. Instead of the absurdly low

ceiling now fixed, **we recommend that even one Member of the Tribunal should be fully authorized to decide claims in accident cases irrespective of the amount involved.**

3.20.4 We were informed that although production of the ticket as proof of having travelled is not mandatory, some Benches have insisted on such proof, thereby delaying the payment of compensation. **We endorse the recommendation made by the "Group on Railway Safety" that in case of death, compensation should be paid irrespective of whether the bonafide authority to travel has been produced or not.**

3.21 Safety Organization

3.21.1 Every transport body has a wing that acts as the watchdog on safety. In the present organizational structure of the Railways, the key personnel in the safety organization come from the Traffic Department. The Sikri Committee had recommended a revamp of the Safety Organization on the Railways and suggested that instead of being the preserve of the Traffic Department, it should be thrown open to officers from any of the five departments directly associated with train operation, namely, Traffic, Civil Engineering, Mechanical Engineering, Signal & Telecommunication and Electrical Engineering, the rationale for suggesting a modification being that the safety organization needed to be more broad based and that this set-up which was meant to facilitate other departments in the discharge of their safety functions would be better served by also

selecting officers from the other major departments. This recommendation was not accepted by the Ministry of Railways.

3.21.2 The Committee discussed the pros and cons of changing the structure of the safety organization. The safety set-up, as it exists today, is handicapped on a few counts. A major weakness is that generally only the officers of ordinary calibre of the Traffic department are sent to the Safety department, an admission made by senior Traffic officers to the Committee. However, our committee would like to consider this matter in greater detail in the Final Report. In the interim **our committee recommends that:**

(i) Railways must ensure that only officers with an outstanding record of service are posted to the Safety department for a tenure of at least two years.

(ii) Each safety officer must be supported by very good calibre officers/inspectors of other departments for a 2-year tenure.

(iii) Each department at Headquarters/division must organize safety as a subject to be dealt with intra-departmentally with the safety department working as catalyst.

(iv) All posts of DSOs should be in JA grade so that they can interact with colleagues in the best possible manner.

(v) Only those officers of the Traffic Department who have worked a minimum of 2 years as DSO will be considered for posting as Chief Operations Manager.

3.22 Fire on Trains – Metro Railway

3.22.1 During the Committee's visit to Metro Railway, Calcutta in January, 1999, we were informed that there have been a total of six accidents on the system since Inception of through running in 1995. Out of these six accidents, four cases were of fire due to equipment failure in the rakes. Further discussion brought out that apart from these five cases, there have been incidents of smoke emission which have not been reported as it does not come within the ambit of "fire" as defined in the Metro Railway Accident Manual. What worries us is that in the first nine months of the financial year 1998-99, there were 11 incidents of smoke emission due to various defects in the rolling stock, which have not been reported as accidents.

3.22.2 Fire in Metro systems can be devastating and is a more serious matter than a fire on normal trains. Smoke emission is indicative of equipment failure which can easily develop into a full-fledged fire. **The Committee, therefore, recommends that the definition of fire in Metro Railways Accident Manual be revised so as to include smoke emission.**

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TRAIN ACCIDENTS ON INDIAN RAILWAYS - A STATISTICAL APPRECIATION

(CHAPTER: IV / THE RAILWAY SAFETY REVIEW COMMITTEE, 1998: H. R. KHANNA COMMITTEE REPORT 1998)

4

4.1 At a very early stage of our investigations, we were informed by the Ministry of Railways that detailed records were not available to make a meaningful analysis of accidents covering the 30-year period from 1968. The terms of reference were subsequently modified by the Government and the revised terms of reference suitably abridged to cover analysis of accidents for a timeframe of 20 years from 1978. Adequate statistical data was not available even for this truncated period, and it was then decided in consultation with the Ministry of Railways, to make an analysis of accidents from 1988- 89 to 1997-98, a ten-year period, which would provide a sufficient coverage to enable us to make meaningful comparisons and discern the trend of accidents. However, South-Eastern Railway has not been able to give the details of accidents for the period 1988-89 to 1992-93, and Southern Railway has indicated that information for the two years 1988- 89 and 1989-90 is not available. We have had

to approximate the figures by reference to previous/subsequent data.

4.2 Our analysis has been confined to "consequential" train accidents, i.e., Collisions, Derailments, Level Crossing accidents and Fires in trains. This was also the approach adopted by the three earlier Committees. We also propose to study "indicative" accidents such as drivers passing signal at danger, breach of block rules as also asset failures, as they are symptomatic of unsafe acts and have the potential for causing accidents. The results will be included in our Final Report.

4.3 The current definition of train accidents has emerged from the recommendation of the Kunzru Committee, which had first coined the term and drawn the distinction between "consequential" train accidents and "indicative" accidents. According to the Kunzru Committee, "consequential" accidents are accidents which normally result in loss of life, limb, or damage to property; and "indicative" accidents are mishaps, generally not resulting in casualties but which are indicative of unsafe acts or unsafe conditions of work or defective Railway equipment. The Kunzru Committee recommended that the focus of the study of accidents should be on "consequential" train accidents which have repercussions in the form of casualties and damage to property, a view subsequently endorsed by the Wanchoo and Sikri Committees.

4.4 Accident Manuals of the various Zonal Railways have stated: "A train accident is an accident involving a train which may be a set of vehicles, empty or loaded, worked by a locomotive, any other self-propelled unit, empty or carrying passengers, parcel or goods, running under a particular number or a distinct name from a fixed point of departure to a fixed destination. Consequential train accidents are (i) collisions; (ii) derailments; (iii) level crossing accidents; and (iv) fires in trains."

4.5 Although the definitions extracted above are quite clear about what qualifies as a consequential train accident, some explanatory instructions issued by Railway management have resulted in different interpretations by different people. The Manual of Statistical Instructions, the guidebook on compilation of Railway Statistics, is quite explicit in identifying the derailments which should be covered under "train accidents", which include even comparatively minor accidents such as the following type of occurrences: "Derailments during reversing or shunting operation, etc., on an incoming, outgoing or any other load, including a sectional carriage, etc., shall be deemed to be a train derailment when the train engine or a vehicle still forms a part of the train derailed, irrespective of whether the shunting was being done by the train engine or by a shunting engine. If, however, the derailed vehicle(s) do not form a part of a train, the derailment would be classified as 'other derailments' whether shunting was being done by the train engine or by a shunting engine."

4.6 The Committee recommends that **the Railways should report accidents and compile statistics in strict accordance with the instructions given in the Manual of Statistical Instructions. We disapprove of the tendency to introduce changes in the methods of statistical compilation.**

4.7 Of all the problems that surfaced during our critical inquiry into past accidents, the most difficult to resolve was the issue of doctored statistics which we have already discussed in detail in Chapter 11. The Committee found that the accident statistics furnished by Zonal Railways had some inconsistencies. The Committee has done its best to reconcile figures wherever possible. It would be appropriate to state at this juncture that the statistical appreciation that we give in the

following pages is a substantial and representative sample of train accidents on Indian Railways.

4.8 Compilation of data on accidents and other safety related statistics on the Railways needs recasting. Development of a universally applicable format that will give the complete profile of each accident is necessary. Such a format will enable a meaningful analysis of accident trends and help pinpoint vulnerable areas in the system. **We recommend that at the earliest, a computerized database of accidents should be maintained by individual Zonal Railways in a universal format, which can be accessed by the Railway Board to update its own data base using the recently installed RAILNET. The format should be designed by the Railway Board.**

4.9 The most significant aspect of the figures given in the chapter, which have been obtained directly from the Zonal Railways, is that they differ from the official statistics published by the Ministry of Railways. The Committee has decided to base its analysis of accidents on the figures furnished by the Zonal Railways for the valid reason that these are a closer approximation to the actuals.

4.10 Wherever Railway-wise analysis has been given it should be viewed in the light of the following variants.

Year- 1997-98

RLY	Route Kms			Passenger Train Kms (in millions)			Freight Train Kms (in millions)		
	BG	MG	NG	BG	MG	NG	BG	MG	NG
CR	6062.39	-	996.98	57.82	-	1.57	34.38	-	0.21
ER	4095.32	-	132.53	33.04	-	0.32	32.40	-	-
NR	9094.91	1670.79	260.53	63.11	6.60	0.99	45.90	1.34	0.03
NE	1995.65	3015.80	-	13.75	14.14	-	4.24	1.48	-
NF	1416.63	2244.66	87.48	5.63	3.29	0.07	3.86	1.60	-
SR	4107.35	2902.16	-	30.10	12.40	-	13.98	0.92	-
SC	5623.34	1496.16	-	37.38	4.74	-	32.09	0.28	-
SE	6025.21	-	1254.28	30.40	-	2.52	42.74	-	0.35
WR	4661.75	4474.62	876.48	32.20	12.03	0.67	29.33	5.31	0.03
Total	43082.55	15804.19	3607.98	303.43	53.21	6.15	238.93	10.92	0.62

Total Train Kms (in millions)			
BG	MG	NG	All Gauges
92.19	-	1.78	93.97
65.44	-	0.32	65.76

109.01	7.94	1.02	117.97
17.99	15.62	-	33.61
9.49	4.89	0.07	14.45
44.08	13.32	-	57.40
69.47	5.03	-	74.50
73.14	-	2.87	76.01
61.53	17.34	0.70	79.57
542.35	64.13	6.77	613.25

4.11 General Overview

Table -1

Consequential accidents – category-wise

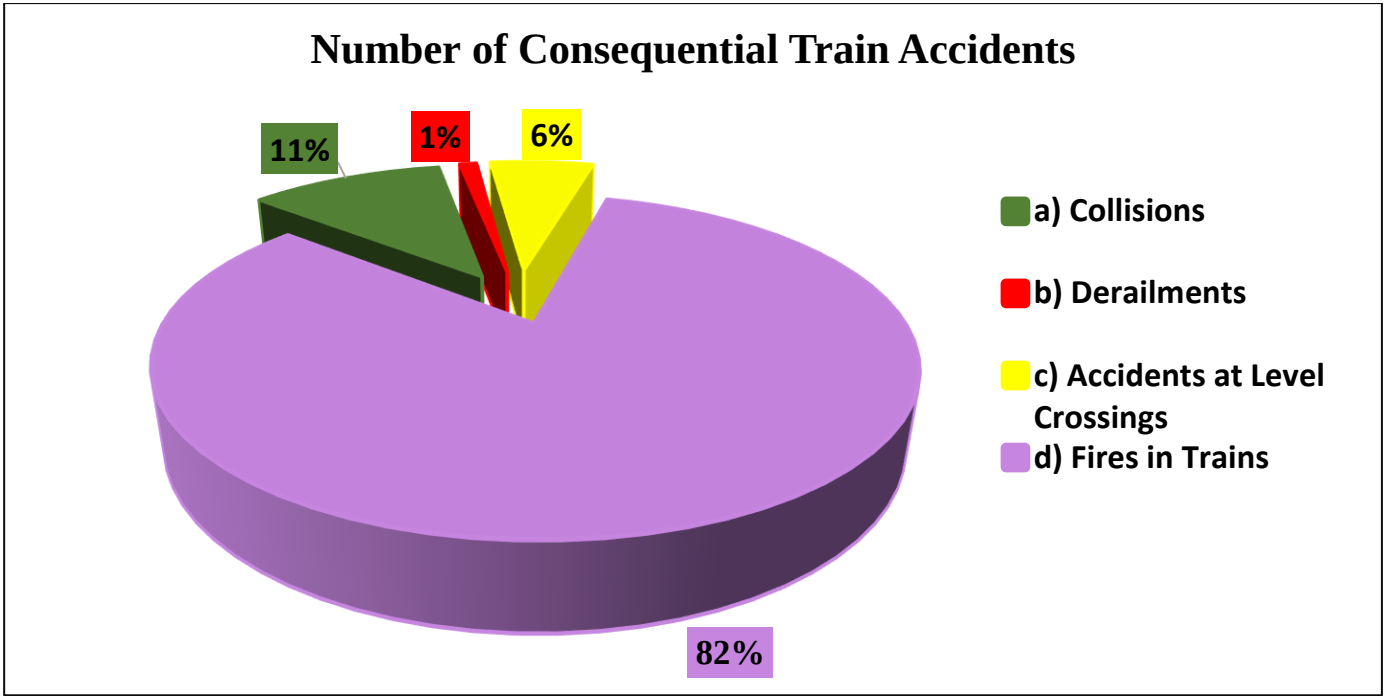
Year	No. of Collisions	No. of Derailments	No. of Accidents at Level crossings	No. of Fires in trains	Total No. of all Categories of accidents	Incidence per million Train Kilometers
1988-89	30	457	55	3	545	0.91
1989-90	34	457	42	8	541	0.88
1990-91	41	445	37	9	532	0.86
1991-92	30	655	48	9	742	1.18
1992-93	53	613	71	9	746	1.18

Total of 5 years	188	2627	253	38	3106	1.00
1993-94	54	547	71	3	675	1.07
1994-95	36	487	74	7	604	0.94
1995-96	29	336	69	6	440	0.67
1996-97	26	328	66	6	426	0.64
1997-98	35	315	65	5	420	0.62
Total of 5 years	180	2013	345	27	2565	0.79

Table – 1/A

5- year moving averages for all consequential accidents – Category-wise

Moving 5-year averages for the period ending:	Collisions	Derailments	Accidents at Level crossings	Fires in Trains	All consequential Accidents	Incidence per Million TKMs
31.03.93	37.60	525.40	50.60	7.60	621.20	1.002
31.03.94	42.40	543.40	53.80	7.60	647.20	1.034
31.03.95	42.80	549.40	60.20	7.40	659.80	1.046
31.03.96	40.40	527.60	66.60	6.80	641.40	1.008
31.03.97	36.40	462.20	70.20	6.20	578.20	0.9
31.03.98	36.00	402.60	69.00	5.40	513.00	0.788


Number of Consequential Train Accidents
11%
1%
6%
82%
a) Collisions
b) Derailments
c) Accidents at Level Crossings
d) Fires in Trains

4.11.1 The figures point to a substantial reduction in the number of train accidents from 1995-96 onwards, especially derailments. The five-year moving averages indicate that the incidence per million train kilometers has shown an improving trend in the past few years.

4.11.2 Level Crossing accidents have increased considerably in the last five years.

Table – 2

Collisions:

P= Passenger Trains **O= Other Trains** **T= Total**

Year	Broad Gauge			Meter Gauge			Narrow Gauge			All Gauges combined		
	P	O	T	P	O	T	P	O	T	P	O	T
1988-89	14	11	25	4	1	5	0	0	0	18	12	30
1989-90	21	10	31	0	3	3	0	0	0	21	13	34
1990-91	21	18	39	2	0	2	0	0	0	23	18	41
1991-92	15	11	26	3	1	4	0	0	0	18	12	30
1992-93	23	27	50	2	1	3	0	0	0	25	28	53
Total of 5 years	94	77	171	11	6	17	0	0	0	105	83	188
1993-94	27	25	52	2	0	2	0	0	0	29	25	54
1994-95	18	14	32	3	1	4	0	0	0	21	15	36
1995-96	14	13	27	0	2	2	0	0	0	14	15	29
1996-97	9	16	25	1	0	1	0	0	0	10	16	26

1997-98	16	16	32	2	1	3	0	0	0	18	17	35
Total of 5 years	84	84	168	8	4	12	0	0	0	92	88	180

Table – 3

Derailments:

P= Passenger Trains **O= Other Trains** **T= Total**

Year	Broad Gauge			Meter Gauge			Narrow Gauge			All Gauges combined		
	P	**O**	**T**	**P**	**O**	**T**	**P**	**O**	**T**	**P**	**O**	**T**
1988-89	52	265	317	24	108	132	8	-	8	84	373	457
1989-90	89	250	339	26	88	114	3	1	4	118	339	457
1990-91	66	252	318	24	102	126	1	-	1	91	354	445
1991-92	76	429	505	36	95	131	9	10	19	121	534	655
1992-93	103	356	459	53	86	139	13	2	15	169	444	613
Total of 5 years	386	1552	1938	163	479	642	34	13	47	583	2044	2627
1993-94	77	378	455	23	61	84	5	3	8	105	442	547
1994-95	97	342	479	26	17	43	4	1	5	127	360	487
1995-96	93	209	302	16	16	32	2	0	2	111	225	336
1996-97	99	209	308	12	8	20	0	0	0	111	217	328
1997-98	85	202	287	20	6	26	2	0	2	107	208	315
Total of 5 years	451	1340	1791	97	108	205	13	4	17	561	1452	2013

Table – 4

Derailments:

P= Passenger Trains O= Other Trains M= Manned UM= Un-Manned T= Total

Year	Trains	Number of Accidents											
		Broad Gauge			Meter Gauge			Narrow Gauge			All Gauges combined		
		M	UM	T	M	UM	T	M	UM	T	M	UM	T
88-89	P	10	12	22	2	17	19	0	0	0	12	29	41
	O	5	4	9	2	3	5	0	0	0	7	7	14
	T	15	16	31	4	20	24	0	0	0	19	36	55
89-90	P	9	14	23	1	10	11	0	3	3	10	27	37
	O	3	2	5	0	0	0	0	0	0	3	2	5
	T	12	16	28	1	10	11	0	3	3	13	29	42
90-91	P	13	9	22	1	7	8	0	2	2	14	18	32
	O	2	3	5	0	0	0	0	0	0	2	3	5
	T	15	12	27	1	7	8	0	2	2	16	21	37
91-92	P	1	15	16	5	20	25	0	0	0	6	35	41
	O	2	3	5	1	1	2	0	0	0	3	4	7
	T	3	18	21	6	21	27	0	0	0	9	39	48
92-93	P	18	24	42	4	12	16	0	2	2	22	38	60
	O	5	5	10	0	0	0	0	1	1	5	6	11

	T	23	29	52	4	12	16	0	3	3	27	44	71
93-94	**P**	9	23	32	1	23	24	2	3	5	12	49	61
	O	1	7	8	0	2	2	0	0	0	1	9	10
	T	10	30	40	1	25	26	2	3	5	13	58	71
94-95	**P**	12	27	39	4	18	22	0	1	1	16	46	62
	O	4	6	10	0	2	2	0	0	0	4	8	12
	T	16	33	49	4	20	24	0	1	1	20	54	74
95-96	**P**	12	32	44	1	10	11	0	3	3	13	45	58
	O	2	7	9	1	1	2	0	0	0	3	8	11
	T	14	39	53	2	11	13	0	3	3	16	53	69
96-97	**P**	13	25	38	1	10	11	0	0	0	14	35	49
	O	6	6	12	1	3	4	0	1	1	7	10	17
	T	19	31	50	2	13	15	0	1	1	21	45	66
97-98	**P**	10	30	40	2	14	16	0	0	0	12	44	56
	O	3	5	8	1	0	1	0	0	0	4	5	9
	T	13	35	48	3	14	17	0	0	0	16	49	65

Table – 4A

Accidents at Level Crossings in 5-years blocks

Year	Trains	Number of Accidents											
		Broad Gauge			Meter Gauge			Narrow Gauge			All Gauges combined		
		M	UM	T	M	UM	T	M	UM	T	M	UM	T
88-89 to 92-93	P	51	74	125	13	66	79	0	7	7	64	147	211
	O	17	17	34	3	4	7	0	1	1	20	22	42
	T	68	91	159	16	70	86	0	8	8	84	169	253
93-94 to 97-98	P	56	137	193	9	75	84	0	7	9	67	219	286
	O	16	31	47	3	8	11	0	1	1	19	40	59
	T	72	168	240	12	83	95	0	8	10	86	259	345

Table – 5

Fires in trains:

P= Passenger Trains **O= Other Trains** **T= Total**

Year	Broad Gauge			Meter Gauge			Narrow Gauge			All Gauges combined		
	P	O	T	P	O	T	P	O	T	P	O	T
88-89	1	1	2	1	0	1	0	0	0	2	1	3
89-90	5	0	5	3	0	3	0	0	0	8	0	8

90-91	7	2	9	0	0	0	0	0	0	7	2	9
91-92	6	2	8	1	0	1	0	0	0	7	2	9
92-93	8	0	8	1	0	1	0	0	0	9	0	9
Total of 5 years	27	5	32	6	0	6	0	0	0	33	5	38
93-94	3	0	3	0	0	0	0	0	0	3	0	3
94-95	5	0	5	2	0	2	0	0	0	7	0	7
95-96	5	1	6	0	0	0	0	0	0	5	1	6
96-97	4	2	6	0	0	0	0	0	0	4	2	6
97-98	5	0	5	0	0	0	0	0	0	5	0	5
Total of 5 years	22	3	25	2	0	2	0	0	0	24	3	27

4.11.3 Tables 2 to 5 give the break-up of train accidents involving passenger and other trains gauge-wise, with each category of accident shown in a separate table.

The following points emerge:

(i) The trend of collisions has not followed a consistent trajectory but has been widely fluctuating over the years. The preponderance of collisions has been on the Broad Gauge, which carries the bulk of passenger and freight traffic and at higher speeds than on the other gauges,

(ii) The number of derailments of freight and other trains is almost invariably more than twice the number of passenger train derailments. However, the figures show a decline in the

number of "other" train derailments in the four years from 1994-95 to 1997-98, but the incidence of passenger train derailments has not shown a similar downward trend.

(iii) There has been sharp increase in the accidents at unmanned level crossings in the last 5 years. Also, expectedly, passenger trains, which run at higher speeds than other trains, have been involved in a much larger number of level crossing accidents.

(iv) The incidence of fires in trains has followed an uneven trajectory. In the three years from 1995-96 to 1997-98, all the fire accidents have occurred on the Broad Gauge and mostly in passenger trains.

Table – 6

Casualties in train accidents

K= Killed I= Injured T=Total M=Manned UM=Unmanned

Year	Collisions			Derailments			Accidents at Level Crossings								
							K			I			T		
	K	I	T	K	I	T	M	UM	T	M	UM	T	M	UM	T
88-89	10	116	126	144	481	625	10	42	52	57	77	134	67	119	186
89-90	18	135	153	154	553	707	10	41	51	72	120	192	82	161	243
90-91	86	385	471	39	265	304	61	14	75	114	61	175	175	75	250
91-92	46	343	389	81	231	312	5	99	104	50	252	302	55	651	406
92-93	108	371	479	57	298	355	48	68	116	131	91	222	179	159	338

93-94	148	417	565	53	177	230	24	144	168	39	273	312	63	417	480
94-95	22	120	142	41	348	389	52	135	187	45	114	159	97	249	346
95-96	424	547	971	27	196	223	30	108	138	30	161	191	60	269	329
96-97	68	102	170	64	243	307	59	162	221	126	138	264	185	300	485
97-98	72	236	308	109	556	665	24	110	134	67	112	179	91	222	313

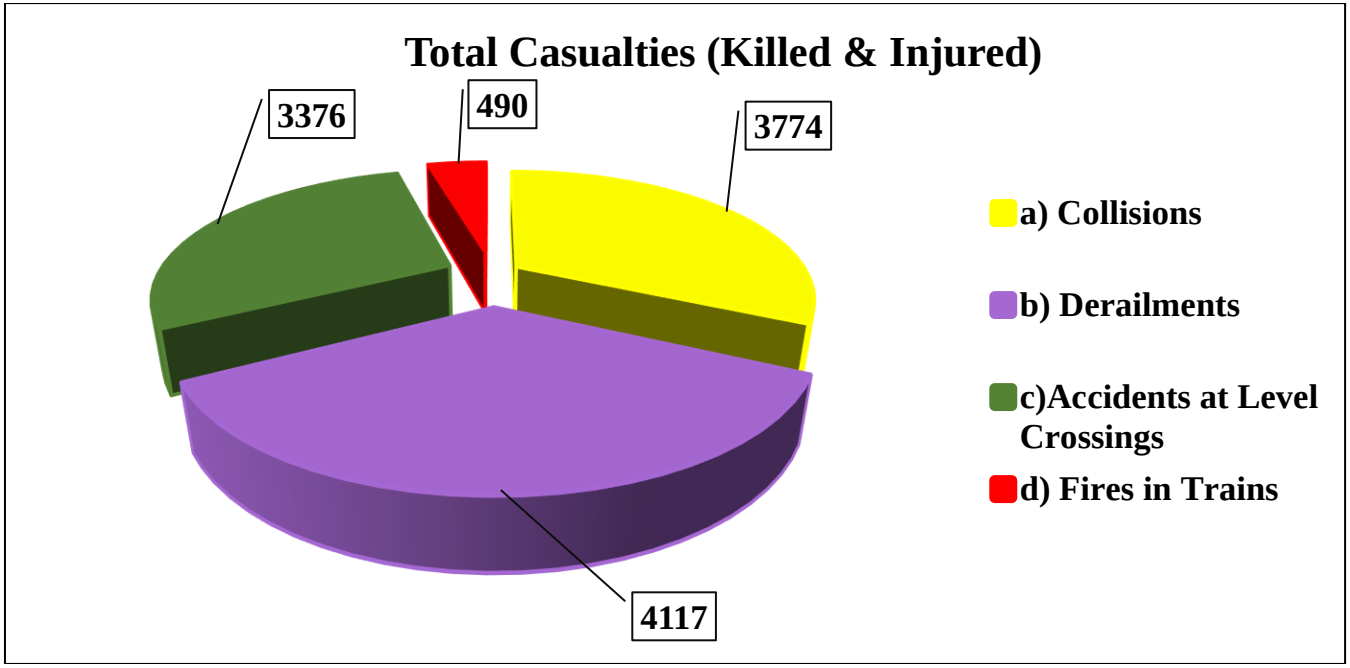
Fires in train			**All categories of accidents**		
K	**I**	**T**	**K**	**I**	**T**
25	5	30	231	736	967
16	112	128	239	992	1231
122	63	185	322	888	1210
4	20	24	235	896	1131
1	17	18	282	908	1190
0	0	0	369	906	1275
48	49	97	298	676	974
0	0	0	589	934	1523
0	1	1	353	610	963
1	6	7	316	977	1293

4.11.4 Table – 6 is an all-inclusive summary of the total casualties in train accidents, i.e., Railway Passengers, Railway Workers and Road Users, in the period under review.

Table – 7

Casualties in different categories of accidents (Period 1988-89 to 1997-98)

Category of consequential accidents	No. of accidents	%age of total	Total casualties	%age of total	Killed	%age of total	Injured	%age of total
a) Collisions	368	6.49	3774	32.10	1002	30.98	2772	32.53
b) Derailments	4640	81.82	4117	35.02	769	23.78	3348	39.28
c) Accidents at Level Crossings	598	10.54	3376	28.71	1246	38.53	2130	24.99
d) Fires in Trains	65	1.15	490	4.17	217	6.71	273	3.2
e) Total	5671	100	11757	100	3234	100	8523	100



4.11.5 Table – 7 above is a summary of the casualties suffered under the different categories of accidents.

4.12 Collisions

Table – 8

Year	Number of Collisions	Incidence per Million TKMs	Total Number of consequential train accidents	Percentage of Collisions to Total Accidents
88-89	30	0.05	545	5.50
89-90	34	0.06	541	6.28
90-91	41	0.07	532	7.71
91-92	30	0.05	742	4.04
92-93	53	0.08	746	7.10
Total of 5 years	188	0.06	3106	6.05
93-94	54	0.09	675	8.00
94-95	36	0.06	604	5.96
95-96	29	0.04	440	6.59
96-97	26	0.04	426	6.10
97-98	35	0.05	420	8.33
Total of 5 years	180	0.05	2565	7.00

Table – 8 A

5-year Moving average and incidence of Collisions in comparison with total accidents for the period 88-89 to 97-98

5-year moving averages for the period ending:	Collisions	Incidence per million TKMs	All Accidents	%age of Collisions to all accidents
31.03.93	37.6	0.062	621.2	6.126
31.03.94	42.4	0.070	647.2	6.626
31.03.95	42.8	0.070	659.8	6.562
31.03.96	40.4	0.064	641.4	6.338
31.03.97	39.6	0.062	578.2	6.750
31.03.98	36.0	0.056	513.0	6.996

4.12.1 During the period 1988-89 to 1997-98, there have been 5671 consequential train accidents on the Indian Railways, out of which 368 accidents fall under the category of "Collisions". Accidents in this category constitute 6.5% of the total consequential train accidents, as the figures given in Table - 8 above would show.

4.12.2 For an appreciation of the broad trends of collisions, we have bifurcated the ten-year period under review into two blocks of 5 years. It is evident that the Railways has not made much headway in reducing collisions which have grave consequences in terms of passenger casualties. In 1988-89, there were 30 Collisions, and in 1997-98, there were 35 Collisions, although the safety efficiency

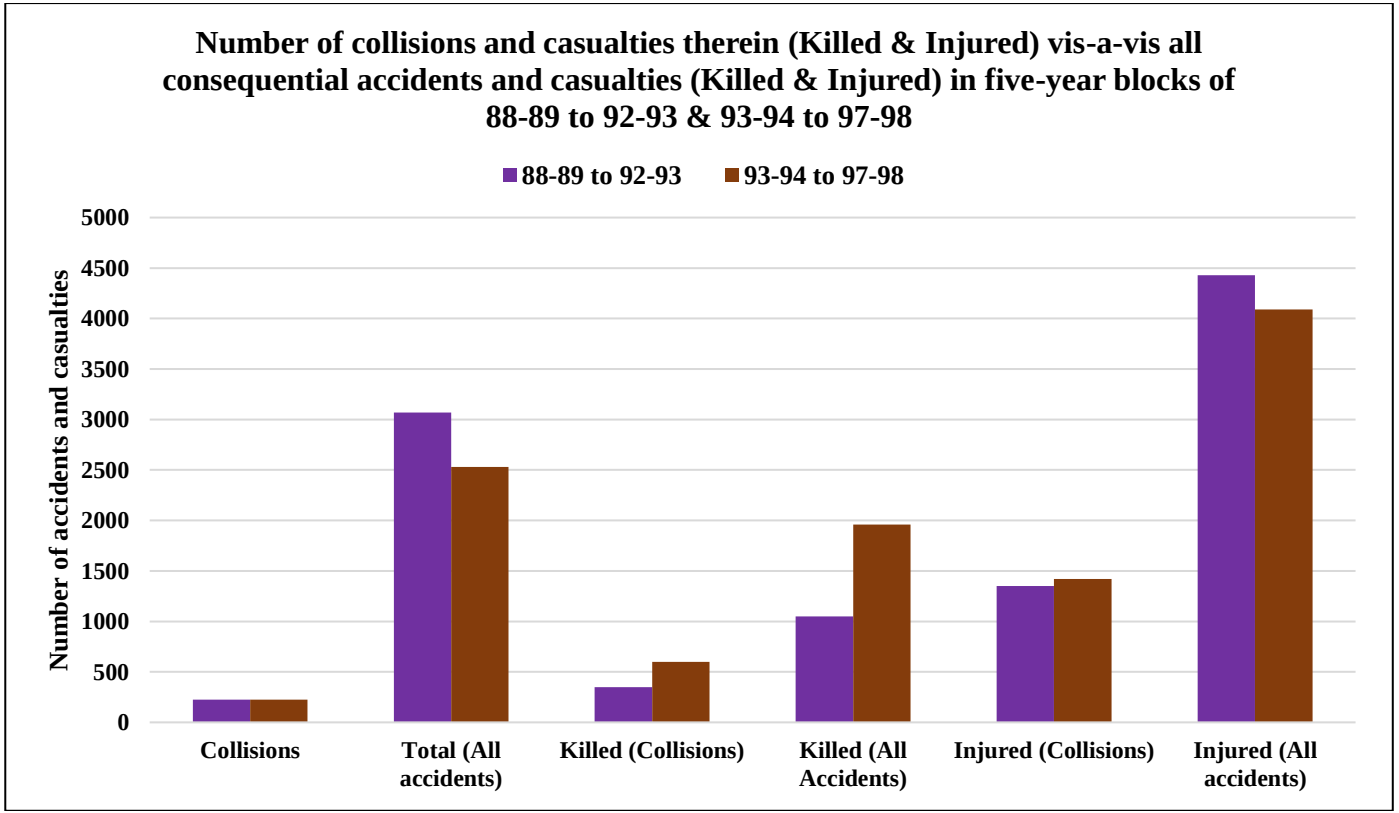
index, i.e., incidence per million train kilometers, indicates that the Railways improved its performance in 1997-98. Similarly, the incidence of Collisions per million train kilometers, which stood at 0.06 at the end of first 5-year period, came down to 0.05 in the subsequent 5-year period.

Table – 9

Casualties in Collisions

K=Killed **I=Injured**

Year	No. of collisions	Total of all categories of accidents	%age of collisions total no. of accidents	Casualties in collisions		Casualties in all Categories of accidents		%age of casualties in collisions to all categories of accidents		
				K	I	K	I	K	I	Total
88-89	30	545	5.50	10	116	231	736	4.33	15.76	13.03
89-90	34	541	6.28	18	135	239	992	7.53	13.61	12.43
90-91	41	532	7.71	86	385	322	888	26.71	43.35	38.93
91-92	30	742	4.04	46	343	235	896	19.57	38.28	34.39
92-93	53	746	7.10	108	371	282	908	38.29	40.86	40.25
93-94	54	675	8.00	148	417	369	906	40.10	46.03	44.31
94-95	36	604	5.96	22	120	298	676	7.38	17.75	14.58
95-96	29	440	6.59	424	547	589	934	71.99	58.56	63.76
96-97	26	426	6.10	68	102	353	610	19.26	16.72	17.65
97-98	35	420	8.33	72	236	316	977	22.78	24.16	23.82


Number of collisions and casualties therein (Killed & Injured) vis-a-vis all consequential accidents and casualties (Killed & Injured) in five-year blocks of 88-89 to 92-93 & 93-94 to 97-98
88-89 to 92-93
93-94 to 97-98
Number of accidents and casualties
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Collisions
Total (All accidents)
Killed (Collisions)
Killed (All Accidents)
Injured (Collisions)
Injured (All accidents)

4.12.3 The figures furnished in Table 9 show that although the percentage of collisions to total accidents ranges between 4 to 8.3 percent, the percentage of casualties in collisions has fluctuated between a low of 12.4 percent to a high of 63.7 percent.

4.12.4 The Deaths as a result of collisions in the second five-year period were much higher as compared to the first five-year period.

Table – 10

Table showing the number of collisions on Broad Gauge and Meter Gauge

Incd. = Incidence per million train kilometers

Year	Rly.	BG	MG	Total	Incd.
88 | 89 to 92	CR	32	0	32	0.06
	ER	40	0	40	0.12
	NR	23	3	26	0.05
	NE	7	2	9	0.05
	NF	3	4	7	0.07
	SR	11	0	11	0.02
	SC	16	3	19	0.06
	SE	29	0	29	0.08
	WR	10	5	15	0.03

Year	Rly.	BG	MG	Total	Incd.
88 | 89 to 92	CR	37	0	37	0.06
	ER	31	0	31	0.08
	NR	26	2	28	0.05
	NE	8	3	11	0.07
	NF	2	1	3	0.04
	SR	9	2	11	1.75
	SC	11	0	11	0.03
	SE	24	0	24	0.05
	WR	20	4	24	0.05

	Metro	0	0	0	0		**Metro**	0	0	0	0
93	**KRC**	0	0	0	0	**93**	**KRC**	0	0	0	0
	Total	171	17	188	0.06		**Total**	168	12	180	0.05

4.12.5 The Table - 10 gives the Railway-wise summary of collisions during the period under review. Individual Railway-wise analysis reveals that there had been a steady increase in the year-wise number and incidence of collisions on the Eastern Railway followed by Central, South-Eastern and Northern Railways in the first five-year block. In the second 5-year block, Central Railway registered the highest number of collisions followed by Eastern, Northern, South-Eastern and Western Railways in that order.

4.12.6 On the Meter Gauge, the number of collisions on all the Zonal Railways showed an improvement with a continuous drop from one 5-year period to the next, but this improvement must be viewed in the context of the rapid shrinking of the Meter Gauge network on account of "Project Uni-gauge".

4.12.7 There were no collisions on the Narrow Gauge of the Indian Railways during the period under review.

Table – 11

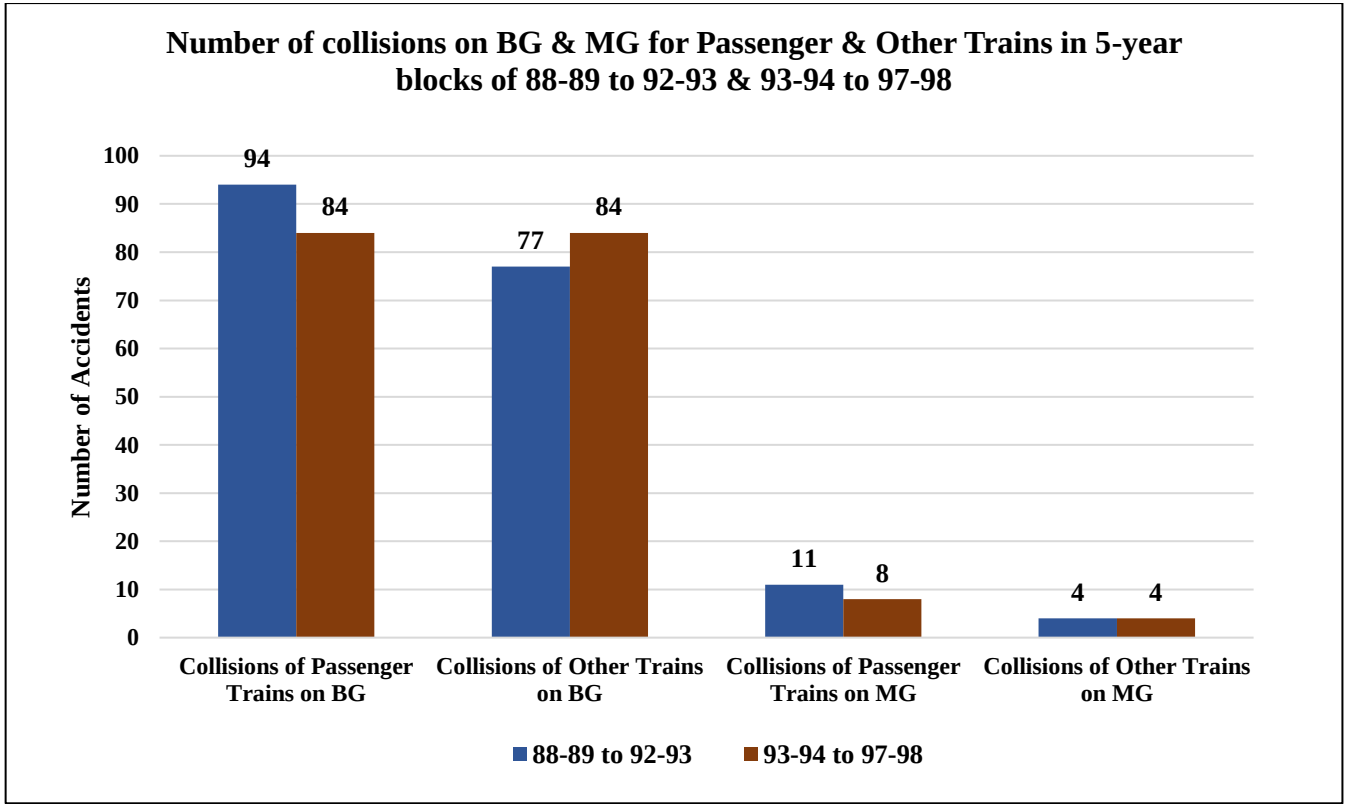
Table showing Incidence of collisions separately for Passenger and other trains.
I=Incidence per Million Train Kilometers
P=Passenger Trains **O=Other Trains**

Year	Collisions involving Passenger Trains				Collisions involving other trains			
	BG	I	MG	I	BG	I	MG	I
88-89	14	0.05	4	0.05	11	0.05	1	0.02
89-90	21	0.08	0	0.01	10	0.05	3	0.07
90-91	21	0.08	2	0.02	18	0.08	0	-
91-92	15	0.05	3	0.03	11	0.05	1	0.02
92-93	23	0.08	2	0.02	27	0.13	1	0.02
5 years Total	94	0.07	11	0.03	77	0.07	4	0.02
93-94	27	0.09	2	0.03	25	0.11	0	-
94-95	18	0.06	3	0.04	14	0.06	1	0.04
95-96	14	0.04	0	-	13	0.06	2	0.10
96-97	9	0.03	1	0.02	16	0.07	0	-
97-98	16	0.04	2	0.03	16	0.07	1	0.08
5 years Total	84	0.05	8	0.02	84	0.07	4	0.04

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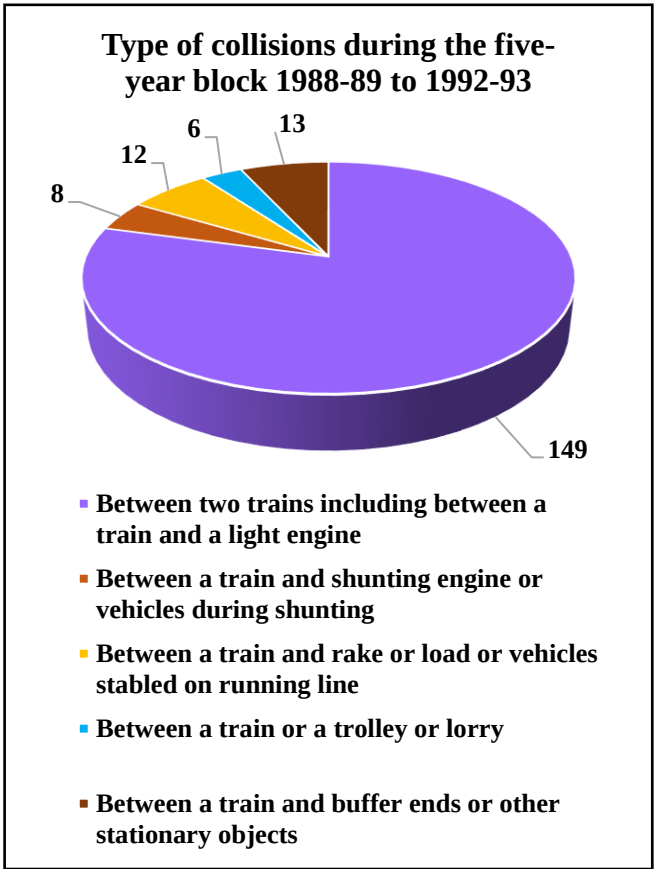
Year	Total Collisions				Incidence (All gauges)	
	BG	I	MG	I	P	O
88-89	25	0.05	5	0.04	0.05	0.05
89-90	31	0.06	3	0.02	0.06	0.05
90-91	39	0.08	2	0.02	0.06	0.07
91-92	26	0.05	4	0.03	0.05	0.05
92-93	50	0.10	3	0.02	0.07	0.11
5 years Total	171	0.07	17	0.03	0.06	0.06
93-94	52	0.10	2	0.02	0.08	0.10
94-95	32	0.06	4	0.04	0.05	0.06
95-96	27	0.05	2	0.02	0.03	0.06
96-97	25	0.04	1	0.01	0.02	0.06
97-98	32	0.05	3	0.04	0.04	0.07
5 years Total	168	0.06	12	0.03	0.05	0.07

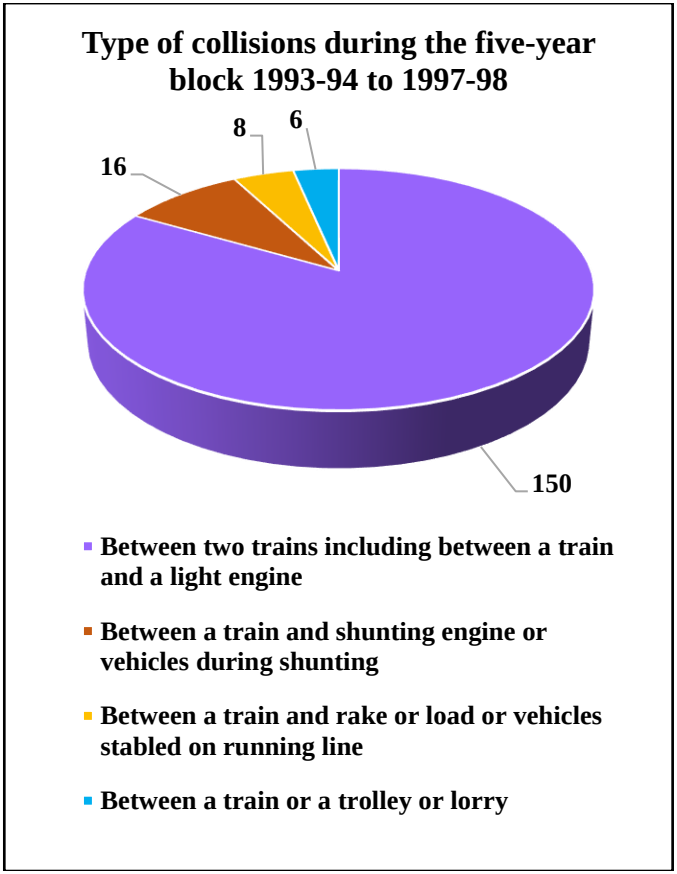

Number of collisions on BG & MG for Passenger & Other Trains in 5-year blocks of 88-89 to 92-93 & 93-94 to 97-98
Number of Accidents
100
90
80
70
60
50
40
30
20
10
0
94
84
77
84
11
8
4
4
Collisions of Passenger Trains on BG
Collisions of Other Trains on BG
Collisions of Passenger Trains on MG
Collisions of Other Trains on MG
88-89 to 92-93
93-94 to 97-98

4.12.8 In Table - 11, Collisions have been shown separately for passenger and other trains. Although the number of Collisions involving passenger trains have been fewer in the 5-year period from 1993-94 to 1997-98 when compared to the earlier 5-year period, it would be wrong to conclude that there is a definite downward trend in Collisions involving passenger trains. Our contention is borne out by the fact that in 1997-98, there were 18 Collisions of passenger trains, the same number as in 1988-89. On the Meter Gauge, there was a drop in the number of Collisions involving passenger trains from 11 in the first 5-year period to 8 in the next, with incidence per million passenger train kilometers dropping from 0.03 to 0.02. This improvement has to be viewed against the background of shrinkage of MG.

Types of Collisions **Table – 12**

PERIOD	Between two trains including between a train and a light engine		Between a train and shunting engine or vehicles during shunting		Between a train and rake or load or vehicles stabled on running line		Between a train or a trolley or lorry		Between a train and buffer ends or other stationary objects		TOTAL
	Total collisions	%age to total	Total collisions	%age to total	Total collisions	%age to total	Total collisions	%age to total	Total collisions	%age to total	
88-89 to 92-93	149	79.2	8	4.25	12	6.4	6	3.2	13	6.9	188
93-94 to 97-98	150	83.3	16	8.9	8	4.4	6	3.3	0	0	180


Type of collisions during the five-year block 1988-89 to 1992-93
13
6
12
8
149
Between two trains including between a train and a light engine
Between a train and shunting engine or vehicles during shunting
Between a train and rake or load or vehicles stabled on running line
Between a train or a trolley or lorry
Between a train and buffer ends or other stationary objects


Type of collisions during the five-year block 1993-94 to 1997-98
8
6
16
150
Between two trains including between a train and a light engine
Between a train and shunting engine or vehicles during shunting
Between a train and rake or load or vehicles stabled on running line
Between a train or a trolley or lorry

4.12.9 Table - 12 provides a summary of the different types of Collisions. This shows that there has been a preponderance of Collisions "between two trains including between a train and a light engine", which have the gravest consequences and result in the worst possible disasters. The proportion of collisions of this particular type to the total number of collisions was 79.2% and 83.3% respectively, for the first and second five-year periods.

Table – 13

Nature of Collisions

P=Passenger Trains **O= Other Trains**

Year	Collisions									
	Head-on		Rear-end		Side Collisions		Running over obstruction		Total	
	P	O	P	O	P	O	P	O	P	O
88-89	4	6	9	3	4	3	1	0	18	12
89-90	4	4	13	8	3	1	1	0	21	13
90-91	4	4	13	11	5	2	1	1	23	18
91-92	5	3	7	8	6	0	0	1	18	12
92-93	7	5	11	15	6	4	1	4	25	28
5 years Total	24	22	53	45	24	10	4	6	105	83
93-94	4	6	13	10	7	7	5	2	29	25
94-95	3	3	13	10	4	1	1	1	21	15

95-96	2	7	8	7	4	1	0	0	14	15
96-97	1	2	5	12	4	2	0	0	10	16
97-98	2	6	9	7	6	4	1	0	18	17
5 years Total	12	24	48	46	25	15	7	3	92	88

4.12.10 Table 13, gives another perspective of collisions based on the nature and position of trains at the point of impact, i.e., head-on, rear-end, etc. Rear-end collisions constitute by far the highest number under this category, which is mainly explained by the fact that on double line sections, which carry the highest volume of traffic, the movement of trains is uni-directional.

Table – 14

Table showing Involvement of Diesel Locomotives in Collisions and mode of working.

Year	**Head-on**		**Rear-end**		**Side Collisions**		**Total**		
	LH	**SH**	**LH**	**SH**	**LH**	**SH**	**LH**	**SH**	**Total**
88-89	4	5	4	1	1	2	9	8	17
89-90	1	2	5	4	0	0	6	6	12
90-91	5	1	6	5	4	3	15	9	24
91-92	3	3	7	4	5	1	15	8	23
92-93	3	1	9	4	2	2	14	7	21
5 years Total	16	12	31	18	12	8	59	38	97
93-94	5	3	5	2	6	9	16	14	30

94-95	2	4	4	3	0	1	6	8	14
95-96	3	0	5	2	0	3	8	5	13
96-97	2	1	3	3	0	1	5	5	10
97-98	0	0	5	3	1	1	6	4	10
5 years Total	12	8	22	13	7	15	41	36	77

Note: NFR, SER and WR have not furnished figures on LH & SH position for the entire 10-year block and SR has also not furnished figures for the first five-year block period 1988-89 to 1992-93 and hence not included.

4.12.11 Table-14 gives statistics of diesel locos involved in collisions vis-à-vis the mode of working, i.e., long-hood leading or short-hood leading. From the figures, it is seen that there is greater incidence of collisions in long-hood leading trains.

Collisions classified according to main causes.

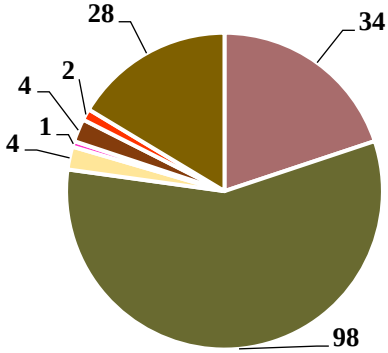
Table – 15

Principal causes of train collisions – Broad Gauge

Causes	88-89 to 92-93		93-94 to 97-98	
	Number of collisions	%age	Number of collisions	%age
i) Reception of a train on blocked line or dispatching into a blocked section	34	19.88	31	18.45
ii) Drivers disregarding	98	57.31	99	58.93

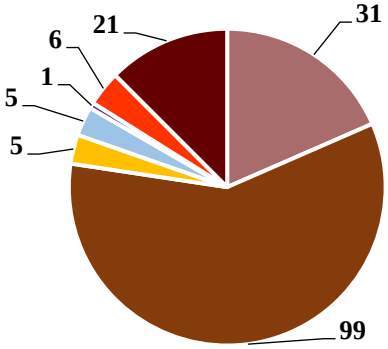
	signals or falling to control train				
iii)	**Reception on line fouled by vehicles from adjacent line**	4	2.34	5	2.98
iv)	**Derailed vehicles obstructing adjacent line in mid-section**	1	0.58	5	2.98
v)	**Unauthorized tampering with signal gear**	4	2.34	1	0.60
vi)	**Trollies or lorries not being protected**	2	1.17	6	3.57
vii)	**Other causes**	28	16.37	21	12.50
viii)	**Total**	**171**	**100**	**168**	**100**

Principal causes of train collisions in Broad Gauge during the five-year block 88-89 to 92-93



- i) Reception of a train on blocked line or dispatching into a blocked section
- ii) Drivers disregarding signals or falling to control train
- iii) Reception on line fouled by vehicles from adjacent line
- iv) Derailed vehicles obstructing adjacent line in mid-section and train colliding with it
- v) Unauthorized tampering with signal gear
- vi) Trollies or lorries not being protected
- vii) Other causes

Principal causes of train collisions in Broad Gauge during the five-year block 93-94 to 97-98



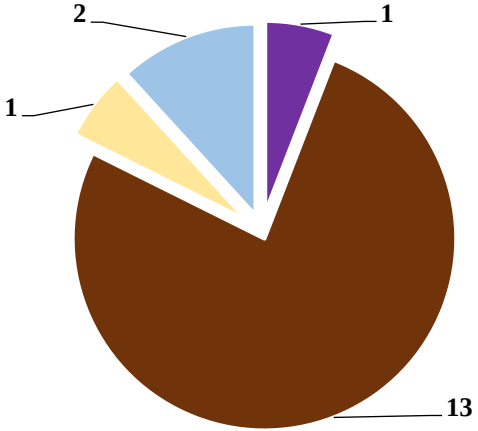
- i) Reception of a train on blocked line or dispatching into a blocked section
- ii) Drivers disregarding signals or falling to control train
- iii) Reception on line fouled by vehicles from adjacent line
- iv) Derailed vehicles obstructing adjacent line in mid-section and train colliding with it
- v) Unauthorized tampering with signal gear
- vi) Trollies or lorries not being protected
- vii) Other causes

Table – 16

Principal causes of train Collisions – Meter Gauge

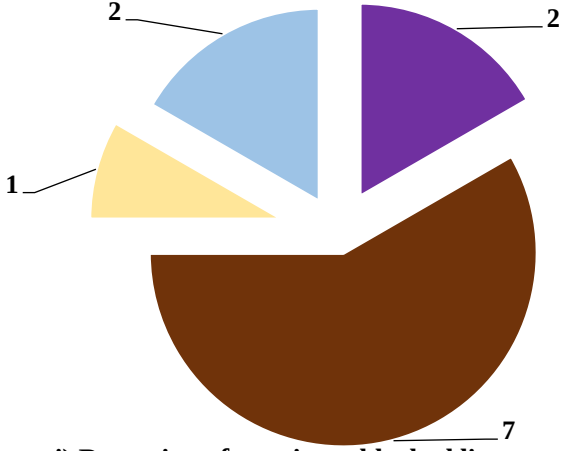
Causes	88-89 to 92-93		93-94 to 97-98	
	Number of collisions	%age	Number of collisions	%age
ix) Reception of a train on blocked line or dispatching into a blocked section	1	5.88	2	16.67
x) Drivers disregarding signals or falling to control train	13	76.47	7	58.33
xi) Reception on line fouled by vehicles from adjacent line	0	0	1	8.33
xii) Derailed vehicles obstructing adjacent line in mid-section	1	5.88	0	0
xiii) Unauthorized tampering with signal gear	0	0	0	0
xiv) Trollies or lorries not being protected	0	0	0	0
xv) Other causes	2	11.76	2	16.67
xvi) Total	**17**	**100**	**12**	**100**

Main causes of train collisions on the Meter Gauge during the five-year block 88-89 to 92-93



- i) Reception of a train on blocked line or dispatching into a blocked section
- ii) Drivers disregarding signals or falling to control train
- iii) Derailed vehicles obstructing adjacent line in mid-section and train colliding with it
- iv) Other causes

Main causes of train collisions on the Meter Gauge during the five-year block 93-94 to 97-98



- i) Reception of a train on blocked line or dispatching into a blocked section
- ii) Drivers disregarding signals or falling to control train
- iii) Derailed vehicles obstructing adjacent line in mid-section and train colliding with it
- iv) Other causes

4.12.12 An analysis of the causes of collisions reveals that collisions on account of "drivers disregarding signal or failing to control train" were a preponderant factor both on the Broad Gauge and the Meter Gauge. During the period under review, this group accounted for 197 collisions or 58.11 per cent on BG and 20 collisions or 68.97 per cent on MG. In the two gauges taken together, the percentage of such collisions, le, due to the drivers' errors comes to 58.97 per cent.

4.12.13 The other major cause for collisions is "the reception of a train on a blocked line or despatch into a blocked section". A total of 65 cases or 19.17% of the total on BG and 3 cases or 10.34% of the total on MG were attributed to this cause in the period under review.

4.12.14 Collisions caused due to "derailed vehicles obstructing adjacent line in mid- section and train from opposite direction colliding with it" have become the focus of public attention, especially after the accident near Khanna on Northern Railway in November 1998 and the accident involving GT Express near Mathura in July 1999, both of which resulted in heavy casualties. To an extent, some collisions which fall under this category can be termed as "freak" because of the fact that the obstruction of the adjacent line took place moments before the train from the opposite direction hit the affected spot, giving absolutely no time for any form of protection or even warning. Considering the terrible consequences of such mishaps and the ever-present possibility of such accidents in double and multiple line territories, the Railway administration has been exploring ways and means of providing a warning to approaching trains immediately after an obstruction of the adjacent line has taken place. At present the safety device in use to give such warning is the flasher light provided on the locomotive which is required to be switched 'on' by the driver of the affected train that is obstructing the adjacent

line. In this connection, attention is also invited to our recommendation given in Chapter III. A more effective means of preventing or at least softening the impact of such terrible collisions, is to provide a train-radio communication which would enable the driver of the affected train to immediately give an SOS and warn all trains in the vicinity of the mishap.

It is important that a reliable train-radio communication system is extended over the Indian Railways to all busy routes, in the shortest possible time. We have already given our recommendations in the matter in Chapter II.

Table – 17

Collisions caused due to "drivers disregarding signals/failing to control trains" and "Reception of a train in blocked line/section" during the period 1988-89 to 1997-98 – BG & MG combined.

Railway	Drivers disregarding signal/failing to control train		Reception of a train in blocked line/section		Total	
	Number	%age	Number	%age	Number	%age
CR	42	19.35	6	8.82	48	16.84
ER	38	17.51	31	45.59	69	24.21
NR	30	13.82	10	14.71	40	14.04
NE	16	7.37	4	5.88	20	7.02
NF	6	2.77	2	2.94	8	2.81
SR	12	5.53	5	7.35	17	5.96
SC	18	8.29	2	2.94	20	7.02
SE	20	9.22	8	11.76	28	9.82
WR	35	16.13	-	-	35	12.28
Total	**217**	**100.00**	**68**	**100.00**	**285**	**100.00**

4.12.15 In Table - 17, the number of collisions which occurred due to the two main causes, i.e., drivers' and station staff errors have been juxtaposed Railway-wise.

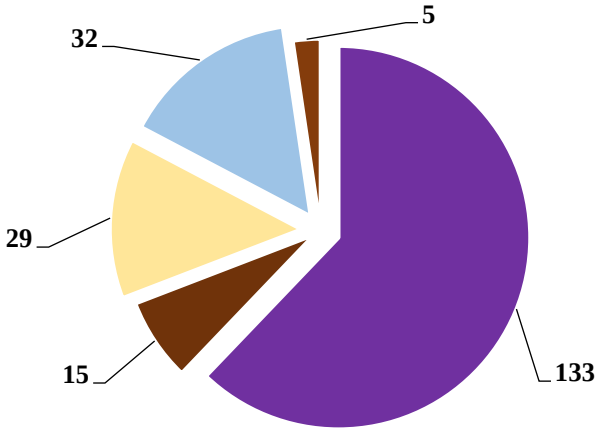
4.12.16 In Four Railways, namely, Central, Eastern, Northern & Western, together contributed about 67.37 per cent of the accidents attributed to these two causes. The number of collisions due to drivers' negligence is highest on Central Railway followed by the Eastern Railway. The most number of cases of "reception of a train in blocked line/section" were on Eastern Railway followed by Northern and South Eastern Railways.

Table – 18

Driver's failure classified.

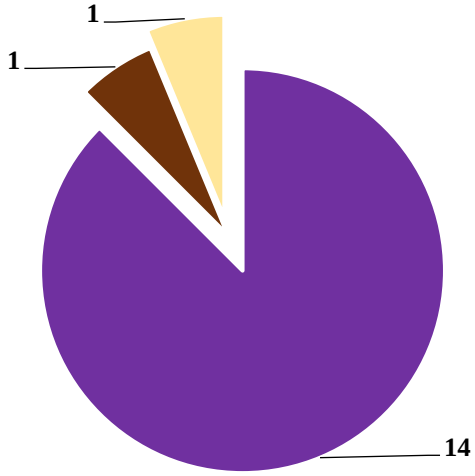
Causes	Broad Gauge		Meter Gauge		Total	
	Number of collisions	%age	Number of collisions	%age	Number of collisions	%age
Collisions causes by drivers:						
a) Disregarding signals or overshooting	133	62.15	14	87.5	147	63.91
b) Failing to control train on account of defective brake power	15	7.01	0	0	15	6.52
c) Mismanagement of the engine crew or running at excessive speed	29	13.55	0	0	29	12.61
d) Not observing rules when passing automatic signal	32	14.95	1	6.25	33	14.35
e) Moving against signal during shunting	5	2.34	1	6.25	6	2.61
f) Total	214	100.0	16	100.0	230	100.0

Collisions on Broad Gauge due to drivers failures classified - during 88-89 to 92-93



- a) Disregarding signals or overshooting
- b) Failing to control train on account of defective brake power
- c) Mismanagement of the engine crew or running at excessive speed
- d) Not observing rules when passing automatic signal
- e) Moving against signal during shunting

Collisions on Broad Gauge due to drivers failures classified - during 88-89 to 92-93



- a) Disregarding signals or overshooting
- b) Not observing rules when passing automatic signal
- c) Moving against signal during shunting

4.12.17 The different types of failure of drivers have been tabulated in Table – 18.

4.12.18 The cases of drivers disregarding signals or overshooting signals, expectedly constituted 64 per cent of the total. Next in the scale of mistakes attributed to drivers were collisions caused due to 'not observing rules when passing automatic signal'. Collisions due to mismanagement of engine crew or running at excessive speed figure in third place in the list.

4.12.19 The Committee is convinced that drivers, by virtue of the pivotal role that they play in ensuring safety should receive the focused attention and assistance of the Railway management, as included in the recommendations.

Table – 19

Station Staff failures classified.

Causes	Broad Gauge		Meter Gauge		Total	
	Number of collisions	%age	Number of collisions	%age	Number of collisions	%age
1. Reception of a train on a blocked line due to:						
i. Line being occupied	31	50.82	2	33.33	33	49.25
ii. Incorrect setting of points	13	21.31	3	50.00	16	23.88
iii. Signals taken off for a	1	1.64	0	-	1	1.49

	train not put back to 'ON'					
iv.	**Fouling mark not clear**	10	16.39	1	16.67	11	16.42
v.	**Obstruction of line during shunting**	6	9.84	0	-	6	8.96
vi.	**At station in automatic territory**	0	-	0	-	0	-
vii.	**Total**	61	100.0	6	100.0	67	100
viii.	**%age of total with reference to Grand Total**	-	70.93	-	75.00	-	71.28
2. Dispatching a train into blocked section:							
a)	**Sending it into a blocked section**	12	57.14	2	100.0	14	60.87
b)	**Incorrect setting of point**	3	14.29	0	-	3	13.04
c)	**Fouling mark not clear**	0	-	0	-	0	-
d)	**Obstruction during shunting or bumping**	6	28.57	0	-	6	26.09

against train going away						
e) Total	21	100.0	2	100.0	23	100.0
f) %age of total with reference to Grand Total	-	24.42	-	25.00	-	24.47
3. Collision in block section or at station due to vehicles escaping	4	100.0	0	-	4	100.0
a) %age of total with reference to Grand Total		4.65	-	-	-	4.25
4. Grand Total	86	100.0	8	100.0	94	100.0

4.12.20 It is evident that nearly 71% of the collisions attributed to station staff occurred at the time of reception of trains. Of these, collisions due to reception on an occupied line constituted 49%, followed by incorrect setting of points which accounted for 24% of collisions. The other prominent failure resulting in such collisions was non-clearance of the fouling mark. All the three types of staff failures mentioned above can be substantially reduced through complete track circuiting of the station section, a point emphasised by the Committee in the recommendations.

4.12.21 Despatching of trains into an occupied block section constitutes 24% of collisions due to mistakes of station staff. Of such collisions, about 61% were due to wrong despatch into a section already occupied. In our recommendations, we have taken care of this type of errors through provision of train radio communication/axle counters.

Table – 20

Categories of staff held responsible for causing collisions.

Categories	BG	%age	MG	%age	Total	%age
A. Station Staff:						
i) SMs, ASMs, CASMs	119		17		136	
ii) Switchmen	37		1		38	
iii) Pointsmen	21		10		31	
iv) Lever/Chairmen	34		1		35	
v) Shunting staff, Yard staff	13		5		18	
vi) Total	224	27.22	34	43.04	258	28.60
B. Running Staff including shunters:						
i) Guards	92		3		95	
ii) Drivers	260		22		282	
iii) Firemen/Diesel & Elect. Assts.	126		15		141	
iv) Shunters	6		2		8	

v) Total	484	58.81	42	53.16	526	58.31
C. Permanent Way Staff:						
i) Permanent Way Inspectors	17		0		17	
ii) P. Way Mistry, Gangmate, Keyman/Gangman	18		0		18	
iii) Total	35	4.25	0	0	35	3.88
D. Loco Maintenance staff:	1	0.12	0	0	1	0.11
E. Carriage & Wagon Staff:	32	3.89	1	1.27	33	3.66
F. Signal Staff:						
i) Signal Inspectors	14		1		15	
ii) Sig. Maintenance & Other Sig. Staff	14		1		15	
iii) Total	28	3.40	2	2.53	30	3.33
G. Other staff like Comml. & Elect. Staff:	19	2.31	0	0	19	2.11
H. Grand Total of all the groups	823	100	79	100	902	100

4.12.22 Expectedly, running staff and Station Staff constitute 88 per cent of the total staff held responsible for collisions. They are the two categories to be targetted for special attention by Railway management.

Table – 21

Loss caused by Collisions.

(Figures in lakhs of rupees)

Year	Number of Collisions	Cost of damages due to collisions		Year	Number of Collisions	Cost of damages due to collisions
1988-89	30	283.63		**1993-94**	54	1495.63
1989-90	34	385.99		**1994-95**	36	790.87
1990-91	41	1777.12		**1995-96**	29	1839.80
1991-92	30	740.57		**1996-97**	26	996.10
1992-93	53	1923.96		**1997-98**	35	931.48
Total	188	5111.27		**Total**	180	6053.88

4.12.23 Table 21 gives the total cost of damages in collisions during the period in question.

4.12.24 In order to understand better the underlying factors that contribute to collisions, the Committee studied different aspects of collisions that occurred in the last five years. Table 22 is a summary of the analysis: -

Table – 22

Collisions on Indian Railways During 1993-94 to 1997-98

		CR	ER	NR	NER	NFR	SR	SCR	SER	WR	Total
Total No. of Collisions		37	31	28	11	3	11	11	24	24	180
No. of Collisions due to failure of Drivers		27	19	12	7	1	6	7	17	18	114
No. of Drivers punished		27	19	11*	7	1	6	7	18@	18	114
Time of occurrence of collisions due to drivers' error	**Day**	13	7	5	4	1	3	1	2	3	39
	Night	14	12	7	3	-	3	6	15	15	75
Age of Drivers	**Below 50 yrs.**	13	5	6	-	-	6	4	4	5	43
	50-55 yrs.	11	9	4	3	1	-	2	10	13	53
	Above 55 yrs.	3	5	2	4	-	-	1	4	-	19
Route	**'A'**	24	12	8	-	-	1	10	11	12	78
	'B'	9	6	6	-	-	8	-	-	3	32
	'C'	1	1	2	-	-	-	1	-	-	5
	'D'	2	9	8	11	2	-	-	4	-	36
	'E'	1	3	4	-	1	1	-	9	9	28
	MG	-	-	-	-	-	1	-	-	-	1
Passenger trains involved		23	10	23	10	1	7	3	5	10	92

Collided due to defective brakes		2	3	2	-	-	-	-	-	-	7
Educational Qualification of drivers involved in collisions	**Non-matric**	10	4	N.A.	2	1	1	6	12	13	49*
	Matric	15	13	N.A.	5	-	3	-	6	4	46
	Graduate/ Diploma	2	1	N.A.	1	-	2	-	-	1	7
Types of Rail Line	**Single**	2	5	7	11	3	2	5	8	8	51
	Double	25	23	21	-	-	9	6	13	16	113
	Triple	6	-	-	-	-	-	-	3	-	9
	Quadruple	3	3	-	-	-	-	-	-	-	6
	Six	1	-	-	-	-	-	-	-	-	1
Signalling System	**Absolute Block**	32	9	16	8	2	7	7	21	6	108
	Automatic Block System	5	22	12	3	1	4	4	3	18	72

Note: *1 case under investigation
****Details of 12 drivers not available**
@In one collision, two drivers were punished (one leading driver and one trailing driver of goods train on South-Eastern Railway)

4.12.24 The following facts emerge:-

(i) 75 Collisions, i.e., 66 percent of collisions where drivers were responsible, took place in the night hours.

(ii) Drivers below 50 years of age were responsible for 43 out of 114 collisions, i.e., 38 percent although they constitute only 23.90 per cent of the total.

(iii) 78 out of 180 collisions, i.e., 43 percent occurred on the 'A' Route consisting of 6761.72 route kilometers (10.82% of total). 'A' route has the maximum traffic density.

(iv) 92 out of 180 collisions, i.e., 51 percent involved passenger trains (Passenger train kilometers form 59.16% of total train kilometers).

(v) 129, i.e., 72 percent of the collisions occurred on double or multiple line sections which carry bulk of traffic.

(vi) Although automatic block working covers less than 5 percent of the Indian Railways' network, as many as 72 out of 180 collisions, i.e., 40 percent, took place in the automatic territory.

4.13 Derailments

4.13.1 Derailments constitute, by far, the highest proportion of the total consequential train accidents on Indian Railways, despite the fact that the non- reported accidents generally fall under this category. Table - 23 shows that the percentage of derailments to total accidents in the 10-year

period under review ranged between a high of 88.27% of the total accidents in 1991-92 to a low of 75% in 1997-98.

Table – 23

Derailments – Year-wise

P= Passenger Trains **O-Other Trains** **T=Total**

Year	No. of Derailments			Incidence per million Train Kms.	Total No. of Accidents	Percentage of derailments total accidents
	P	O	T			
1988-89	84	373	457	0.76	545	83.85
1989-90	118	339	457	0.74	541	84.47
1990-91	91	354	445	0.72	532	83.65
1991-92	121	534	655	1.04	742	88.27
1992-93	169	444	613	0.97	746	82.17
Total	583	2044	2627	0.85	3106	84.58
1993-94	105	442	547	0.86	675	81.04
1994-95	127	360	487	0.76	604	80.63
1995-96	111	225	336	0.51	440	76.36
1996-97	111	217	328	0.49	426	77.00
1997-98	107	208	315	0.47	420	75.00
Total	561	1452	2013	0.62	2565	78.48

Table – 23 A

5-year moving average and incidence of derailments of Passenger & Other trans in comparison with total accidents for the period 88-89 to 97-98

P= Passenger Trains **O-Other Trains** **T=Total**

5-year moving average for the period ending	Derailments			Incidence per Million TKMs	All accidents	%age of derailments to accidents
	P	O	T			
31.03.93	116.60	408.80	525.40	0.85	621.20	84.48
31.03.94	120.80	422.60	543.40	0.87	647.20	83.92
31.03.95	122.60	426.80	549.40	0.87	659.80	83.15
31.03.96	126.60	401.00	527.60	0.83	641.40	81.69
31.03.97	124.60	337.60	462.20	0.72	578.20	79.44
31.03.98	112.20	290.40	402.60	0.62	513.00	78.01

4.13.2 In terms of potential to cause loss of life, injury and damage to assets, derailments rank next to collisions. In fact, Indian Railways has had a number of passenger train derailments, the deaths and injuries in which matched the figures of casualties in many collisions.

4.13.3 Figures of casualties due to derailments are given in Table - 24.

Table – 24

K= Killed **I-Injured** **T=Total**

YEAR	No. of Derailments	No. of Consequential Train accidents	Casualties in Derailments			Casualties in all Accidents			Percentage of Casualties in Derailments to all accidents		
			K	I	T	K	I	T	K	I	T
88-89	457	545	144	481	625	231	736	967	62.34	65.35	64.63
89-90	457	541	154	553	707	239	992	1231	64.43	55.75	57.43
90-91	445	532	39	265	304	322	888	1210	12.11	29.84	25.12
91-92	655	742	81	231	312	235	896	1131	34.47	25.78	27.59
92-93	613	746	57	298	355	282	908	1190	20.21	32.82	29.83
93-94	547	675	53	177	230	369	906	1275	14.36	19.54	18.03
94-95	487	604	41	348	389	298	676	974	13.76	51.48	39.94
95-96	336	440	27	196	223	589	934	1523	4.58	20.99	14.64
96-97	328	426	64	243	307	353	610	963	18.13	39.84	31.88
97-98	315	420	109	556	665	316	977	1293	34.49	56.91	51.43

4.13.4 There is no consistent trend discernible in the incidence of casualties in derailments, thereby underlining the random and unpredictable nature of the repercussions in accidents. This is

clearly evident from the fact that in 1992-93 there were 169 derailments involving passenger trains - the highest number in the period under review, which resulted in 355 casualties whereas in 1997-98 although there were only 107 passenger derailments, there occurred 665 casualties as a consequence thereof.

Table – 25

Passenger Train Derailments

Railway	1988-89 to 1992-93				1993-94 to 1997-98			
	BG	MG	NG	Total	BG	MG	NG	Total
CR	49	0	7	56	60	0	0	60
ER	59	0	0	59	57	0	1	58
NR	78	18	2	98	79	13	5	97
NE	7	27	0	34	24	24	0	48
NF	18	41	1	60	23	19	0	42
SR	26	32	2	60	21	18	0	39
SC	52	20	0	72	41	12	0	53
SE	78	-	22	100	97	0	7	104
WR	19	25	0	44	41	11	0	52
Metro	-	-	-	-	2	-	-	2
KRC	-	-	-	-	6	-	-	6
Total	**386**	**163**	**34**	**583**	**451**	**97**	**13**	**561**

4.13.5 Table - 25 gives the Railway-wise, gauge-wise details of derailments for passenger trains in two 5 year blocks. The most disturbing feature reflected in this table is that there has been a sharp increase in passenger train derailments on the BG in the 5-year block from 1993-94 to 1997-98 when compared to the period between 1988-89 to 1992-93. Overall, the reduction in number of passenger train derailments is negligible, the number in the period 1993-94 to 1997-98 being 561 as compared to 583 in the 5-year block between 1988-89 to 1992-93, the improvement being due almost entirely as a result of reduction in derailments on the narrow gauge. On the BG, there has been an increase in passenger train derailments from 386 in the first 5-year period to 451 in the second block of 5-years.

Table – 26

Other Train Derailments

Railway	1988-89 to 1992-93				1993-94 to 1997-98			
	BG	MG	NG	Total	BG	MG	NG	Total
CR	155	0	1	156	160	0	0	160
ER	195	0	0	195	73	0	0	73
NR	176	57	0	233	262	17	0	279
NE	21	45	0	66	21	13	0	34
NF	48	132	0	180	74	24	1	99
SR	91	116	-	207	128	17	0	145
SC	118	43	0	161	109	12	0	121

SE	670	-	12	682	418	0	3	421
WR	78	86	0	164	95	25	0	120
Metro	-	-	-	-	-	-	-	-
KRC	-	-	-	-	-	-	-	-
Total	**1552**	**479**	**13**	**2044**	**1340**	**108**	**4**	**1452**

4.13.6 Table - 26 gives Railway-wise details of derailments of other trains in two 5-year blocks. It is significant that there has been a substantial reduction in derailments to other trains in the period 1993-94 to 1997-98 when compared with the earlier period.

4.13.7 The Railway-wise analysis shows that the preponderance of passenger train derailments on BG has been on the South-Eastern, Northern, Eastern and Central Railways in both 5-year blocks. The highest number of passenger train derailments have been on South-Eastern and Northern Railways with 78 derailments each in the
first 5-year block and 97 and 79 derailments respectively in the second. There has also been a substantial increase in passenger train derailments on South-Eastern, from 78 in the period 1988-89 to 1993-94 to 97 in the 5-years spanning 1993-94 to 1997-98 and on Central Railway from 49 in the first 5-year block to 60 in the second. There has been reduction in the number of passenger train derailments on the MG and NG in the second 5-year block from 1993-94 to 1997-98.

4.13.8 The analysis of derailments of other' trains shows that the highest number of derailments in both 5 year block periods were on South Eastern Railway. While there was sharp increase in

derailments of other trains on Northern Railway from 176 in the first 5-year block to 262 in the second, on Eastern Railway there was a sharp decrease of other train derailments from 195 in the first 5-year block to 73 in the second.

4.13.9 The reduction in the number of derailments in the second of the 5-year blocks under review has been essentially due to a substantial reduction in "other" train derailments the area of uncertainty in statistical compilation. It should, however, be appreciated that all these statistics have to be judged in the background of a phenomenal increase in both passenger and freight traffic over the years. Despite improvement in the safety index of accidents per million train kilometers (Table-1/page-90), there is increase in absolute numbers in so far as passenger train accidents are concerned. There were only 84 derailments involving passenger trains in 1988-89, and ten years later in 1997-98, there were 107 passenger train derailments (refer Table - 23/page-116). Though we appreciate that there has been considerable increase in passenger traffic, we would like a reduction in absolute number of accidents also, which we consider possible after steps, enunciated in recommendations, are taken.

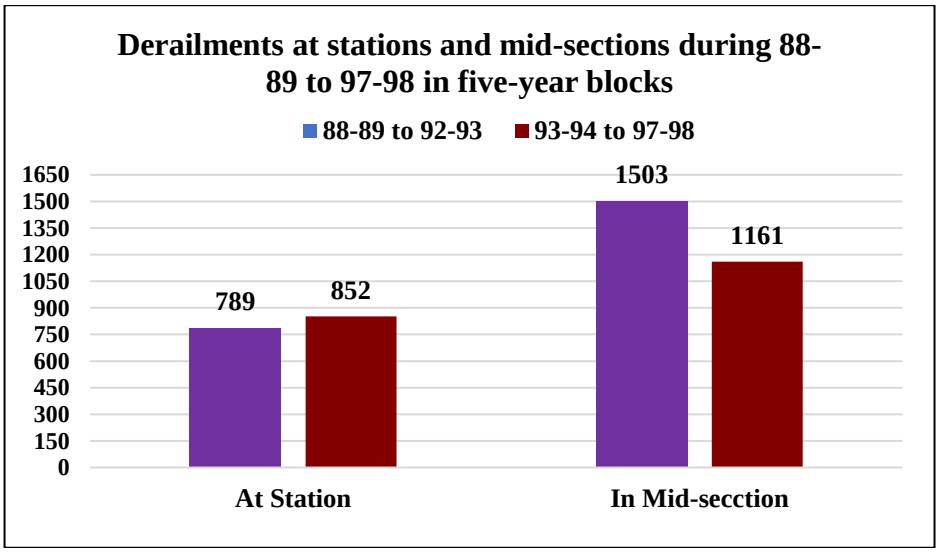
Table – 27

Derailments at station & mid-sections

Year	At Station	In Mid-section	Total
1988-89	166	291	457
1989-90	165	292	457
1990-91	152	293	445
1991-92	139	305	444
1992-93	167	322	489
Total	789	1503	2292
1993-94	227	320	547

1994-95	210	277	487
1995-96	141	195	336
1996-97	135	193	328
1997-98	139	176	315
Total	852	1161	2013

Note: Detailed break-up of derailments at station and mid-section have not been furnished by Southern Railway for the first two years, i.e., 88-89 and 89-90 and by South-Eastern Railway for the first five years from 88-89 to 92-93. Hence, the data have been collected from the Railway Board and incorporated.



4.13.10 Table - 27 has details of derailments at station and in mid-section in two separate 5-year blocks. During the first 5-year period from 1988-89 to 1992-93, mid- section derailments constituted 65 percent of the total derailments, whereas in the second 5-year period mid-section derailments were 57.6 percent of the total.

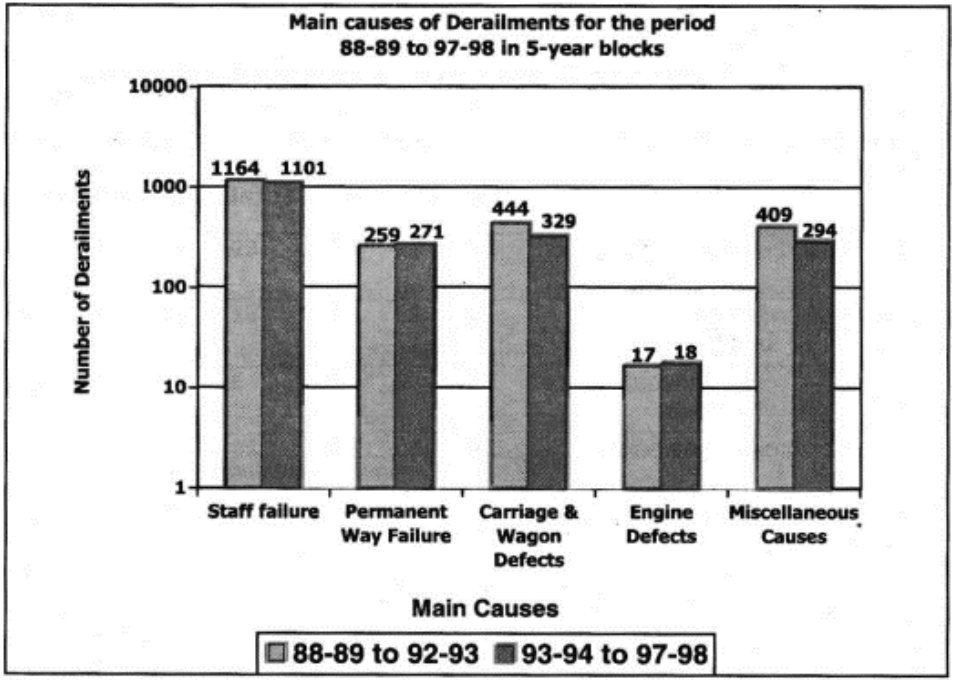
Table – 28

Cause-wise analysis of derailments.

Main Causes	1988-89 to 1992-93				1993-94 to 1997-98			
	BG	MG	NG	Total	BG	MG	NG	Total
1. Staff failure	845	309	10	1164	1020	75	6	1101
2. Permanent Way failure	204	55	0	259	228	43	0	271
3. Carriage & Wagon Defects	265	177	2	444	288	38	3	329
4. Engine Defects	6	11	0	17	13	5	0	18
5. Misc. Causes	347	90	12	409	242	44	8	294
6. Total of all derailments	1627	642	14	2293	1791	205	17	2013

Note:

1. **Figures pertaining to 1988-89 & 1989-90 have not been furnished by Southern Railway.**
2. **South-Eastern Railway have not furnished figures for 5-year period 88-89 to 92-93.**
3. **Figures for above period concerning Southern and South-Eastern Railway have, therefore, been drawn from Railway Board's Statistical Directorate Publications.**



4.13.11 Table - 28 gives the main causes for derailments, gauge-wise, for the two 5 year blocks. Staff failures accounted for 1164 or 50.8 percent of the derailments in the first 5-year period, and 1101 derailments, i.e., 54.7 percent in the second period. Permanent way failures were responsible

for 11.3 percent of the derailments in the first 5-year block and 13.5 percent in the second period. Carriage and Wagon defects accounted for 19.4 percent of the derailments in the first 5-year block and 16.3 percent in the second 5-year period.

Table – 29

Carriage & Wagon defects causing derailments.

S. No.		1988-89 to 1992-93				1993-94 to 1997-98			
		BG	MG	NG	Total	BG	MG	NG	Total
1	**Defective and broken springs or suspensions**	30	29	0	59	40	1	0	41
2	**Breakage of undergear**	22	29	0	51	18	8	0	26
3	**Defective or inadequate or excessive play in brasses.**	1	2	0	3	0	0	0	0
4	**Defective or broken axle boxes**	4	16	0	20	9	0	0	9
5	**Binding brake blocks or defective brakes or brake power.**	2	2	0	4	10	0	0	10
6	**Defective wheel or tyre**	19	8	0	27	30	1	1	32
7	**Broken acle or journal**								
	(a) Hot axle	46	19	0	65	31	3	0	34
	(b) Cold axle	33	10	0	43	25	6	0	31
8	**Seized Roller bearing**	11	0	0	11	9	0	0	9

9	**Coupling failure**	2	6	0	8	5	1	0	6
10	**Defective buffers**	1	0	0	1	4	1	0	5
11	**Defective bogie bolster hangers**	5	3	0	8	7	0	0	7
12	**Combines effects of Rolling stock and track defects or excessive speed but primary cause being in Carriage & Wagon**	42	23	1	66	65	8	1	74
13	**Other defects**	17	25	0	42	35	9	1	45
14	**Total**	235	172	1	408	288	38	3	329

4.13.12 Table - 29 gives the break-up of the different types of C&W defects that caused derailments. Defective springs, hot axles and cold axles were primarily responsible for derailments under this head. These subjects will be dealt with in more detail in the final report.

Table – 30

Permanent Way defects causing derailments.

S. No.	Nature of Permanent-way failure	1988-89 to 1992-93			1993-94 to 1997-98		
		BG	MG	NG	BG	MG	NG
1	**Incorrect Gauge**	41	8	0	61	6	0
2	**Defective cross or longitudinal levels**	13	3	0	22	3	0

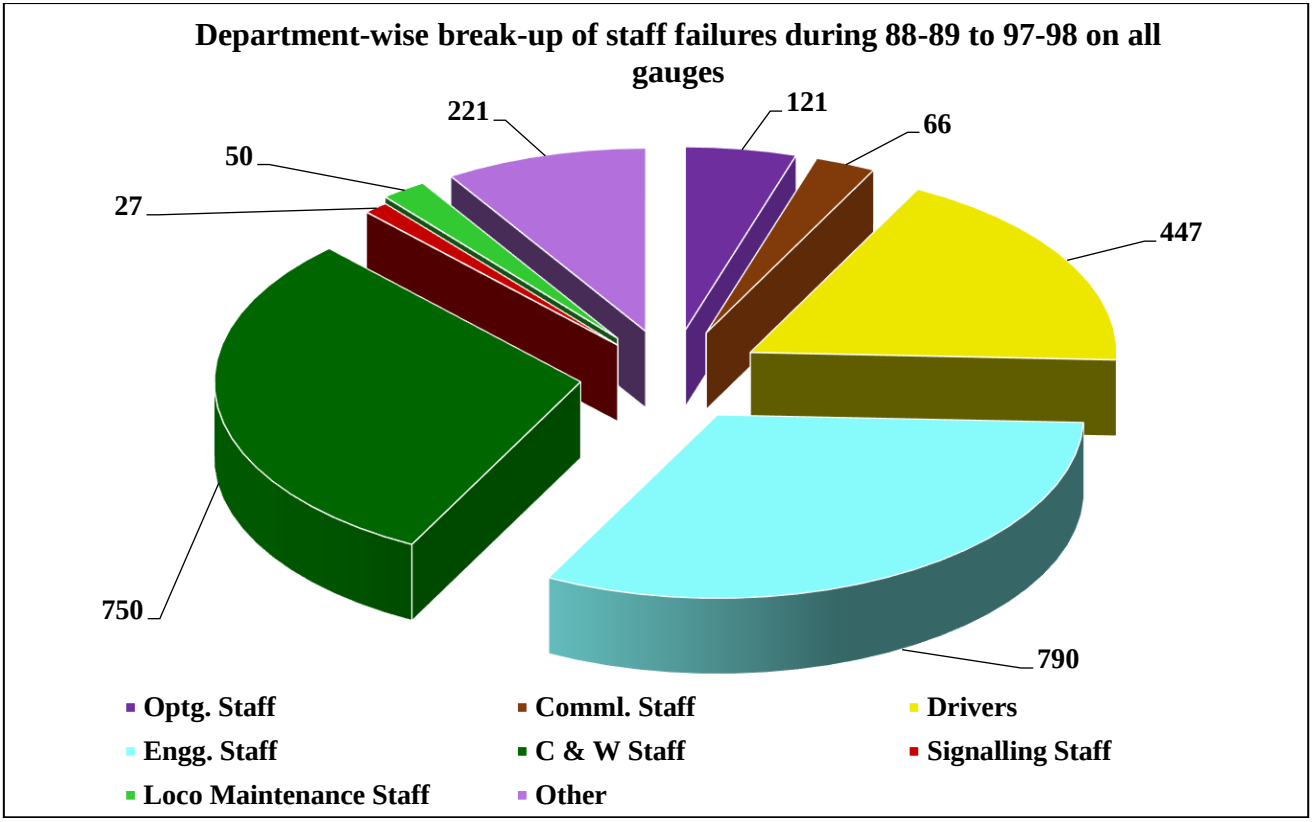
3	**Sinkage of track**	4	2	0	3	1	0
4	**Badly aligned curve/incorrect super elevation/kinks in track**	2	1	0	4	4	0
5	**Defective track materials**	9	3	0	6	1	0
6	**Defective points, crossings or turnouts**	1	1	0	9	1	0
7	**Combined effect of defects in track and Rolling Stock or engine or higher speed but defect in track being the predominant cause, other factors being secondary.**	32	20	0	35	11	0
8	**Other track defects**						
i)	**Rail fractures**	39	8	0	64	12	0
ii)	**Buckling of track**	2	1	0	4	2	0
iii)	**Slack or loose packing**	7	3	0	7	1	0
iv)	**Weld failures**	3	4	0	13	1	0
v)	**Total**	51	16	0	88	16	0
9	**Grand Total**	153	54	0	228	43	0

4.13.13 Table - 30 gives the break-up of the different types of permanent way failure in the two 5 year blocks. Track geometry, i.e., gauge and cross levels & rail fractures are the predominant reasons. Recommendations of the Committee when implemented will bring about improvement in the position.

Table – 31

Derailment-wise break-up of staff failures (all gauges combined)

Year	Optg. Staff	Comml. Staff	Drivers	Engg. Staff	C & W Staff	Signalling Staff	Loco Maintenance Staff	Other Staff	Total
88-89	16	9	65	89	100	5	2	13	299
89-90	16	5	47	92	105	6	2	6	279
90-91	12	8	63	96	97	5	3	12	296
91-92	18	14	57	87	80	3	9	22	290
92-93	8	2	40	87	75	0	9	29	250
93-94	13	7	45	86	71	2	11	29	264
94-95	7	6	45	90	78	1	4	21	252
95-96	8	0	25	60	48	2	3	24	170
96-97	7	7	28	62	50	1	5	24	184
97-98	16	8	32	41	46	2	2	41	188
Total	121	66	447	790	750	27	50	221	2472

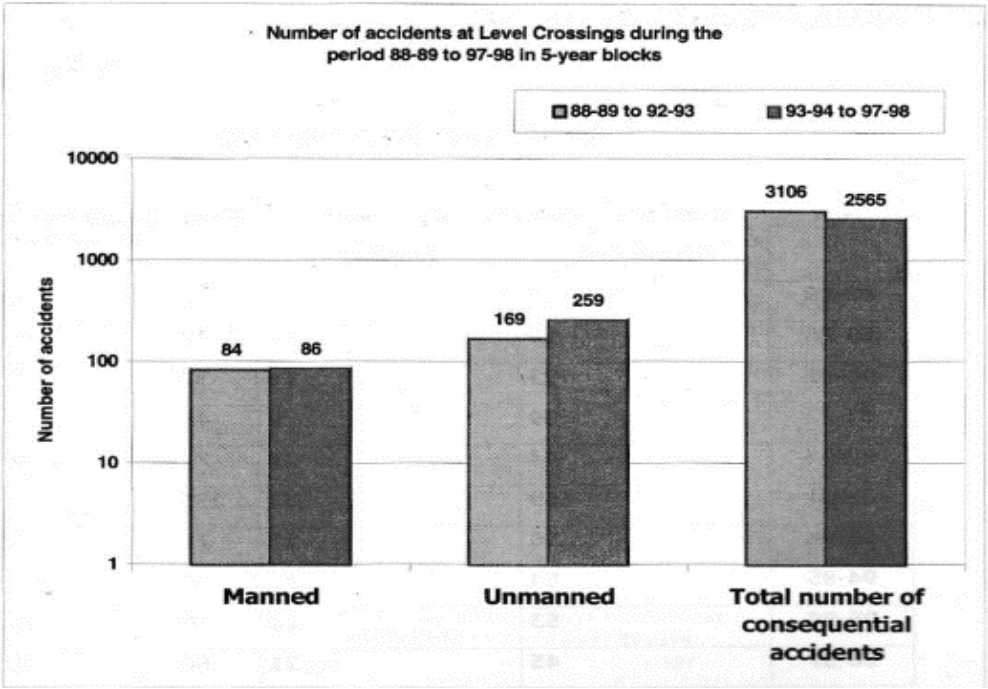

Department-wise break-up of staff failures during 88-89 to 97-98 on all gauges
221
121
66
50
27
447
750
790
Optg. Staff
Comml. Staff
Drivers
Engg. Staff
C & W Staff
Signalling Staff
Loco Maintenance Staff
Other

4.14 Level Crossing Accidents

Table – 32

Accidents at level crossings

Year	Number of Level Crossing accidents		Total	Incident per Million TKMs
	Unmanned	Manned		
88-89	36	19	55	0.09
89-90	29	13	42	0.06
90-91	21	16	37	0.06
91-92	39	9	48	0.08
92-93	44	27	71	0.11
Total	169	84	253	0.08
93-94	58	13	71	0.11
94-95	54	20	74	0.11
95-96	53	16	69	0.11
96-97	45	21	66	0.10
97-98	49	16	65	0.10
Total	**259**	**86**	**345**	**0.10**



4.14.1 The most significant feature of accidents at level crossings during the period under review is the sharp increase in their number over the years though when seen as incidence per million train kilometers, the figure has remained more or less constant since 1992. Whereas the accidents at manned level crossings have fluctuated in the range of 9 to 27 accidents every year, there has been a

noticeable increase in unmanned level crossing accidents in the last 5 years under review. In the first 5-year block from 1988-89 to 1992-93 there were 169 unmanned level crossing accidents which rose to 259 in the second 5-year period, an increase of 53.3 percent. As a proportion of the total accidents, the accidents at level crossing in the first 5-year period under review constituted 8.1 percent of the total, whereas it was 13.4 percent in the second 5 year-block.

Table – 33

Level Crossing accidents – Railway-wise

Year	Railway	Accidents at level crossings	Total accidents	Year	Railway	Accidents at level crossings	Total accidents
1988 | 89 to 1992 |	CR	24	274	1988 | 89 to 1992 |	CR	18	283
	ER	15	312		ER	10	172
	NR	58	421		NR	75	483
	NE	30	140		NE	42	136
	NF	5	253		NF	11	156
	SR	33	313		SR	73	270
	SC	16	275		SC	42	227
	SE	35	848		SE	25	581
	WR	37	270		WR	49	245
	Metro	0	0		Metro	0	6

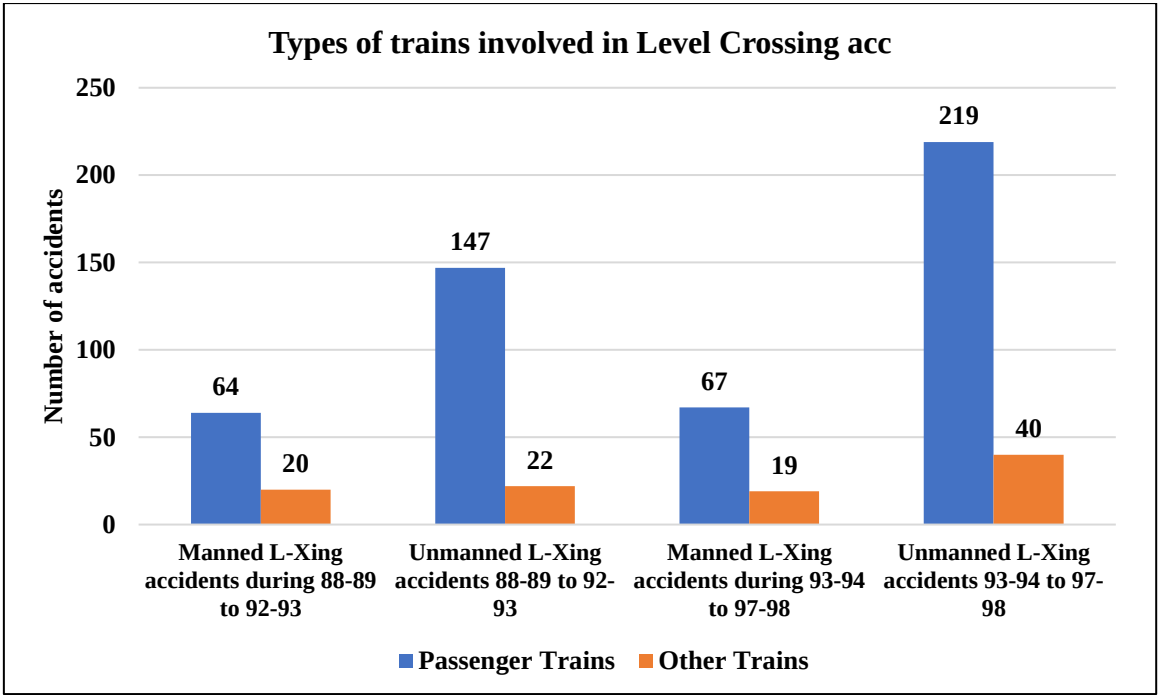
93	**KRC**	0	0	**93**	**KRC**	0	6
	Total	**253**	**3106**		**Total**	**345**	**2565**

4.14.2 The figures of level crossing accidents, Railway wise, show that in the first 5-year block Northern Railway had the maximum number of accidents followed by the Western, South-Eastern and Southern Railways. In the second 5-year period, there was an increase in accidents on Northern Railway from 58 to 75 i.e. 29.3 percent, a very sharp increase on Southern Railway from 33 to 73 i.e., 121 percent increase, and on Western Railway from 37 to 49 accidents i.e. 32.4 percent increase. It is also significant that the number of level crossing accidents reduced on the South-Eastern Railway from 35 in the first 5-year period to 25 in the second 5-year block, on the Central Railway from 24 to 18, and on Eastern Railway from 15 to 10. These statistics should, however, be seen in the backdrop of increase in both road and rail traffic.

Table – 34

Types of trains involved in Level Crossing accidents.

Types of Trains Involved	**Number of accidents at Level Crossings**					
	1988-89 to 1992-93			**1993-94 to 1997-98**		
	Manned	**Unmanned**	**Total**	**Manned**	**Unmanned**	**Total**
Passenger Trains	64	147	211	67	219	286
Other Trains	20	22	42	19	40	59
Total	84	169	253	86	259	345



4.14.3 As is to be expected, most of the trains involved in level crossing accidents are Passenger trains which run at higher speeds than other trains.

Table – 35

Causes of accidents at manned level crossing during 93-94 to 97-98

S. No.	Causes	Period					
		93-94	94-95	95-96	96-97	97-98	Total
1	Due to open or improperly closed or secured gates.	8	8	11	9	7	43
2	Road vehicles coming over the level crossings where barriers on the other side had been closed.	2	1	0	2	0	5
3	Road vehicles crashing into the lifting or Swing type gates or breaking the lock and opening it.	1	4	5	5	4	19
4	Road vehicles breaking or opening the Chains at level crossings closed by chains	0	1	0	0	1	2
5	Road vehicles left at level crossings or infringing the track.	0	0	0	0	0	0
6	Disregard of signals by Drivers.	2	4	0	2	4	12
7	Non-issue of caution order to Driver.	0	0	0	0	0	0
8	Other causes.	0	2	0	3	0	5
9	Total	13	20	16	21	16	86

4.14.4 Of the causes contributing to accidents at manned level crossings, the most prominent is the open or improperly closed gate. In the 5-year period between 1993-94 to 1997-98, this particular cause accounted for 43 accidents out of a total of 86. Road users crashing into the gates were responsible for 19 accidents, i.e. 22 percent, and drivers disregarding signals accounted for 12 accidents, i.e. 14 percent of the total.

Table – 36

Accident at Manned Level Crossings with/without telephone

Year	Accident at Manned Level Crossings		
	Provided with telephone	**Not provided with telephone**	**Total**
93-94	13	0	13
94-95	20	0	20
95-96	16	0	16
96-97	18	3	21
97-98	14	2	16
Total	**81**	**5**	**86**

4.14.5 Though it is seen that the majority of manned Level crossing accidents have occurred at gates provided with telephone communication, the following point is relevant in this connection:

(i) The number of manned level crossings provided with telephones are 13302 while those not provided with telephones are only 2856.

(ii) Density of both road and rail traffic is very much more at manned level crossings provided with telephone.

4.14.6 Although a telephone is an essential and basic requirement at LC gates, it is far from providing fool-proof protection, a point that was made by the Wanchoo Committee also.

Table – 37

Casualties in Level Crossing Accidents

K= Killed **I-Injured** **T=Total**

Year	No. of L-Xing Accidents	No. of Total Accidents	Casualties in L-Xing accidents			Casualties in total accidents			%age of L-Xing casualties to total		
			K	I	T	K	I	T	K	I	T
88-89	55	545	52	134	186	231	736	967	22.5	18.2	19.2
89-90	42	541	51	192	243	239	992	1231	21.3	19.3	19.7
90-91	37	532	75	175	250	322	888	1210	20.3	19.7	20.7
91-92	48	742	104	302	406	235	896	1131	44.3	33.7	35.9
92-93	71	746	116	222	338	282	908	1190	41.1	24.4	28.4
Total	253	3106	398	1025	1423	1309	4420	5729	30.4	23.2	24.8
93-94	71	675	168	312	480	369	906	1275	45.5	34.4	37.6
94-95	74	604	187	159	346	298	676	974	62.7	23.5	35.5
95-96	69	440	138	191	329	589	934	1523	23.4	20.4	21.6
96-97	66	426	221	264	485	353	610	963	62.6	43.3	50.4

97-98	65	420	134	179	313	316	977	1293	42.4	18.3	24.2
Total	**345**	**2565**	**848**	**1105**	**1953**	**1925**	**4103**	**6028**	**44.1**	**26.9**	**32.4**

4.14.7 Taking the entire 10-year period as a whole, it is seen that although level crossing accidents contribute 10.5 percent of the total accidents on Indian Railways, they account for almost 32 percent of the total casualties in all accidents.

4.15 Fire in trains

Table – 38

Fire in Trains

Year	Number of Fires in Trains	Total consequential accidents	Percentage of fires to total accidents
1988-89	3	545	0.56
1989-90	8	541	1.50
1990-91	9	532	1.70
1991-92	9	742	1.20
1992-93	9	746	1.20
Total	38	3106	1.22
1993-94	3	675	0.44
1994-95	7	604	1.16
1995-96	6	440	1.36

1996-97	6	426	1.41
1997-98	5	420	1.19
Total	**27**	**2565**	**1.05**

Table – 39

Fire Accidents – Types of trains.

Period	Passenger trains			Other trains		
	BG	MG	Total	BG	MG	Total
1988-89 to 1992-93	27	6	33	5	-	5
1993-94 to 1997-98	22	2	24	3	-	3

4.15.1 In both periods the fire accidents have occurred mainly on the BG and predominantly in Passenger trains.

Table – 40

Fire Accidents – Railway-wise.

Railway	1988-89 to 1992-93	1993-94 to 1997-98
CR	6	8
ER	3	-
NR	6	4
NE	1	1

NF	1	1
SR	2	2
SC	7	-
SE	2	7
WR	10	0
Metro	-	4
Total	**38**	**27**

4.15.2 In the first 5-year period, Western Railway had the highest number of fire accidents followed by South Central, Northern and Central Railways. In the second 5-year block there was increase in the fire accidents on Central Railway from 6 to 8 and on South-Eastern Railway from 2 to 7.

Table – 41

Cause-wise analysis of fires in trains on Indian Railways During 88-89 to 97-98

Causes	CR	ER	NR	NE	NF	SR	SC	SE	WR	Metro	KRC	Total
Carrying of Kerosene Oil/ Petrol	0	0	0	1	0	1	0	0	0	0	0	2
Carrying of Inflammable Substances	0	1	0	1	0	0	0	0	0	0	0	2
(a) Explosive material/Bomb blast	0	0	0	0	0	0	0	2	1	0	0	3
(b) Acid and chemicals	1	0	1	0	0	0	0	0	2	0	0	4

(c) Gas cylinders	2	0	0	0	0	0	0	0	1	0	0	3
Miscreant activity/sabotage	0	0	0	0	1	1	3	1	0	1	0	7
Cigarette, Beedi ends thrown	1	1	5	0	0	0	2	2	0	0	0	11
Hot axle/uneven loading/overloading	0	0	1	0	0	0	1	0	1	0	0	3
Fires in consignment due to friction	0	0	0	0	0	0	0	1	0	0	0	1
Burning of sigri by Railway staff	0	1	0	0	0	0	0	0	0	0	0	1
Electrical short circuits	0	0	2	0	0	1	0	1	2	1	0	7
Manufacturing defects of electrical parts	0	0	0	0	0	0	0	0	0	1	0	1
Other electrical faults	6	0	0	0	0	0	0	2	0	1	0	9
Cause could not be established	4	0	1	0	1	1	1	0	3	0	0	11
TOTAL	**14**	**3**	**10**	**2**	**2**	**4**	**7**	**9**	**10**	**4**	**0**	**65**

Table – 42

Punishments to staff in Fire Accidents

Year	No. of Staff held responsible	No. of staff punished with		
		Major Penalties	Minor Penalties	Total of Major+ Minor Penalties
1988-89	1	0	1	1
1989-90	4	0	4	4
1990-91	0	0	0	0
1991-92	10	3	0	3
1992-93	7	1	6	7
Total for 5 years	**22**	**4**	**11**	**15**
1993-94	0	0	0	0
1994-95	1	0	1	1
1995-96	0	0	0	0
1996-97	1	0	1	1
1997-98	1	0	0	0
Total for 5 years	**3**	**0**	**2**	**2**

Table – 43

Casualties due to Fire Accidents

Year	Casualties								
	Fire in Trains			All categories of Accidents			%age of those killed/injured in fire to total		
	K	I	T	K	I	T	K	I	T
1988-89	25	5	30	231	736	967	10.80	0.68	3.10
1989-90	16	112	128	239	992	1231	6.70	11.30	10.40
1990-91	122	63	185	322	888	1210	37.90	7.10	15.30
1991-92	4	20	24	235	896	1131	1.70	2.23	2.12
1992-93	1	17	18	282	908	1190	0.35	1.87	1.51
Total for 5 years	168	217	385	1309	4420	5729	12.83	4.90	6.72
1993-94	-	-	-	369	906	1275	0.00	0.00	0.00
1994-95	48	49	97	298	676	974	16.11	7.24	9.95
1995-96	-	-	-	589	934	1523	0.00	0.00	0.10
1996-97	-	1	1	353	610	963	0.00	0.16	0.10
1997-98	1	6	7	316	977	1293	0.30	0.61	0.54
Total for 5 years	**49**	**56**	**105**	**1925**	**4103**	**6028**	**2.55**	**1.36**	**1.74**

K= Killed **I-Injured** **T=Total**

4.16 Detailed accidents and other safety related statistics have been furnished in Appendix-'B'

REVIEW OF ACTION TAKEN ON RECOMMENDATIONS OF THREE EARLIER COMMITTEES

(CHAPTER: V / THE RAILWAY SAFETY REVIEW COMMITTEE, 1998: H. R. KHANNA COMMITTEE REPORT 1998)

5

5.1.1 The Committees earlier appointed to enquire into the Safety situation on IR were required to report on the implementation of recommendations of the previous Committee. This they did.

5.1.2 In the case of our Committee, the Government made a departure & asked for "review of the implementation of all previous Accident Inquiry Committees". This stems from concern regarding the safety situation on IR. Perhaps it was felt that implementation was deficient.

5.1.3 Our study of this most important element of the improvement process confirms the view that **much more needs to be done regarding the recommendations of all Safety Committees than has been achieved so far**. This is not to take away from the fact that quite a lot has been done.

5.1.4 It is really the plethora of other activities, the tight financial situation, politically motivated decisions, the deteriorating law & order situation, the general lax environment in the country and scores of well known factors which make all Government (of which IR is a Department) activity somewhat slow. Subterfuge then becomes a practice.

5.1.5 It is in the light of these facts that our Committee has placed 'IMPLEMENTATION' as the first and most important recommendation (see Chapter-II). Some details have been spelt out so that the process gets institutionalized at several levels and accountability becomes clear from the suggested records. **It is felt that periodic verification of implementation on the ground is the only path to real improvement.**

5.1.6 In its pursuit of showing improvement in the implementation process, the Ministry of Railways found many methods of showing progress in Implementation, which are enumerated below; -

(v) Recommendations were treated as implemented purely on the grounds that necessary instructions had been issued by the Railway Ministry to the Zonal Railways. For instance, the Sikri Committee (Recommendation 65 in Part I) had enjoined upon the Railways the need to improve the overall conditions in the running rooms. This recommendation was treated as implemented as "necessary instructions had been issued to Zonal Railways." Similarly, issue of instructions was given as evidence of implementation of recommendations such as: the need to ensure against shortages of staff in safety categories (Recommendation No.66 of Sikri

Part I); provision of proper equipment and training to gateman (Recommendation No.80 of Sikri Part I); the importance of ensuring that wagons with "rejectable" defects are not turned out of shops (Recommendation No.164 of Sikri Part I); curb on the practice of examining goods loads on the sorting lines (Recommendation No.204 of Sikri Part II); Divisional Safety Officers to be relieved of miscellaneous functions (Recommendation No.249 of Sikri Part II); safety counsellors to be given appropriate training in counselling techniques (Recommendation No.248 of Sikri Part II).

(vi) Recommendations have been treated as implemented with the commissioning of trials, even when it was apparent that actual implementation was still many years down the road. An example of this type is the Railway's response to the Sikri Committee recommendation (no. 127 of Part I) urging the Railways to ensure that no locomotive which is to work a train leaves the shed or yard without speedometer/speed recorder in working order. This recommendation which even today remains only partially implemented, was treated as implemented "in view of the policy decision of the Board to fit all new main line locos with Hasler speed recorders. In similar vein, the Sikri Committee recommendation (no 81 of Part II) that development and manufacture of thick-web turn outs should be undertaken on priority, was treated as implemented on the basis of trials being conducted in 1986. The Sikri Committee recommendations regarding electric lighting of semaphore signals (No. 134 of Part II),

communication between driver, guard and SM (No.175 of Part II) were also disposed off in similar manner.

(vii) Some recommendations were treated as implemented even when there was no implementation. Among the recommendations that fall in this category is the Sikri Committee recommendation (No. 95 of Part II) that Railways should make use of AWS on track for protection of speed restrictions on sections where the AWS system is operative This recommendation was shown as "implemented being long term process", although even today this provision is not available on the AWS system of the Bombay suburban network. On a similar note, the Sikri Committee recommendation (No. 141 of Part I) that BOX wagons should not be loaded beyond their carrying capacity has been treated as implemented, although there are instructions to the effect that BOX wagons can be loaded up to 2 tonnes above their carrying capacity.

5.1.7 From the stockpile of recommendations made by the Kunzru, Wanchoo and Sikri Committees, we have identified the issues that are of deep significance to safety on the Railways today. Considering that the Kunzru Committee submitted its report almost four decades ago and even the last, le. the Sikri Committee Report is twenty years old, many safety issues that were relevant to those Committees have become dated due to attrition and technological obsolescence. For instance, steam locomotives, which were a major concern of the earlier Committees, are now a relic of the past. Whereas there are numerous shortcomings in implementation due to a variety of reasons, we cannot fail to mention the considerable work done by

the Railways on many recommendations such as setting up of training institutions for certain safety categories of staff, welding of rails into longer lengths, handbooks for staff of essential safety categories.

5.1.8 Keeping all these points in view, what we have done is to study the trajectory of the implementation of the earlier Committees important recommendations that are of relevance today. Instead of assessing the recommendations of each Committee in isolation, we have looked at all significant issues of safety raised by the three Committees in their entirety through a historical survey of the views of each Committee on every relevant subject and the Railways' response thereon. Such an approach of sequential narration ensures that we cover each subject fully.

5.2 Track Circuiting

Reference: Kunzru (Recommendation No.84 of Part II); Wanchoo (Recommendation No.169 of Part 1, Recommendation Nos. 116 & 144 of Part II); Sikri (Recommendation 116 of Part 1, Recommendation No. 149 of Part II)

5.2.1 Successive Committees of Enquiry, the Railway Reforms Committee, the Commissioners of Railway Safety, the Standing Committee of Parliament on Railways of Eleventh Lok Sabha, had all emphasized the importance of extending track circuiting at all stations as a basic safety requirement. The Railway management, in turn, wholeheartedly accepted track-circuiting as an essential safety aid. But the erratic progress of track circuiting through the decades provides a striking example of the Railways' inadequate response to the recommendations of earlier Committees.

5.2.2 The Kunzru Committee had recommended that track circuiting should be extensively provided at stations as this device would almost completely eliminate collisions due to a second train being received on an occupied line. This Committee also urged the Railways to research and overcome the difficulties caused due to the paucity of wooden or concrete sleepers. It was also recommended that at large stations and yards, "the provision of route relay interlocking should be considered as an essential measure". At that time, the Railway administration responded with a general statement of intent that track circuiting would be provided "to the maximum extent possible", and that Zonal Railways would be asked to keep the Kunzru Committee's recommendation regarding route relay interlocking in view while making proposals for signalling works."

5.2.3 The Wanchoo Committee noted that the progress in track circuiting had been unsatisfactory: "we cannot help expressing our doubts whether Railways are addressing themselves to the task of providing track-circuiting with the necessary sense of urgency. The Railway Board had indicated that a target of track circuiting 200 stations every year had been fixed, but the actual execution was far short of this target.

5.2.4 An important issue raised by the Wanchoo Committee was that track circuiting should cover the station area between the block clearance points instead of track circuiting only between fouling marks.

5.2.5 The Sikri Committee also raised the issue of track circuiting between block clearance points and urged that "the portion between fouling marks and advanced starter at stations on trunk routes and main lines must be provided with track circuiting on high priority. Constraint of funds and materials must not be allowed to stand in the way." The Railway Reforms

Committee and the Parliament's Standing Committee on Railways (1995-96) also strongly emphasized the need for track circuiting between block section limits on all trunk routes and main lines. It is true that the execution of track circuiting work was slow. After the Ferozabad accident in August, 1995 there has been good progress.

5.2.6 In Chapter II, Committee has indicated what we consider should be the route-wise priorities and target year of completion for track circuiting of stations.

5.3 Auxiliary Warning System/Automatic Train Control/Cab Signalling

Reference: Kunzru (Recommendation No.85 of Part I); Wanchoo (Recommendation No. 170 of Part 1, Recommendation Nos. 148, 149 & 150 of Part II); Sikri (Recommendation No. 117 of Part I and 156 of Part II)

5.3.1 The Railways can feel justifiably aggrieved that Committees of Inquiry have at times recommended the latest state-of-the-art devices for induction on IR without taking into account the financial implications, or the system's capability of absorbing the new technology. To make matters worse, the Railways has readily accepted such recommendations without fully analyzing the feasibility of implementation, as a consequence of which the Railways finds itself unable to show significant compliance. The slow progress of AWS/ATC reflects this dilemma of IR.

5.3.2 The Kunzru Committee had first suggested that automatic train control should be introduced on some suburban sections and specially selected trunk routes. The Committee also urged the Railways to undertake research for adapting the ATC in use in advanced Railway systems to Indian conditions and also suggested introduction of cab-signalling as an experimental measure.

5.3.3 The Wanchoo Committee felt that Indian Railways had not reacted positively to the adoption of ATC. The Committee opined that "if the trial and Installation of ATC been initiated earlier, certain signalling firms in India would have become interested in this field of manufacture already. The Wanchoo Committee made a specific recommendation that on sections with speeds of 100 kmph or over, ATC should be provided. According to the Committee, "as a means to prevent accidents, ATC is only second, if even second, in importance to track circuiting."

5.3.4 The Railways' response to the recommendations of the Wanchoo Committee was quite impressive. It was stated that "besides Howrah- 534 The Railways' response to the recommendations of the Wanchoo Burdwan and Mughalsarai-Gaya sections of Eastern Railways, provision of AWS has been sanctioned for suburban sections of Central and Western Railways also." It was further stated that for providing AWS equipment, priority would be given to suburban sections and trunk routes on which trains run at speeds of 120 kmph and more, with AWS being provided on locomotives of Mail/Express trains and EMUs, although the Wanchoo Committee had recommended that even goods trains be covered. Nevertheless, the Railways' plan outlined above for inducting AWS could not be faulted.

5.3.5 The Sikri Committee criticized the poor progress in installation of AWS, which it attributed to "reluctance to import the equipment and to excessive time taken for its indigenous development and manufacture". It called upon the Railway Board to "take steps to fulfill at least their diluted commitment of providing AWS on trunk routes and suburban sections at the earliest." Although the Committee was aware of the tardy progress of AWS, it recommended a considerable enhancement in the spread of AWS: "a programme should be

drawn up for extending AWS on all trunk routes with speeds of 100 kmph and above, covering all passenger and goods trains." The Railways accepted this recommendation without any reservations, and on the basis of work in progress on Howrah-Burdwan section of Eastern Railway and Church gate-Virar section of Western Railway, the recommendation was treated as implemented.

5.3.6 The Railways are already committed to providing AWS on all suburban sections and trunk routes with speeds of 100 kmph and above which should cover all passenger and goods trains. But almost four decades after this issue was first raised by the Kunzru Committee, AWS has been installed only on the suburban systems of Central and Western Railways. Here too, the AWS system only covers the EMU services but not the other services, not even Mail/Express trains. Perhaps the problem of pilferage of the track magnet of AWS which was encountered in the eastern part of the country was responsible for the delay. The view of our Committee is that despite the importance attached to AWS by previous Committees, the Railways have made very slow progress in extending the use of this vital safety device. Our specific recommendations on the issue are indicated in Chapter II where the issue of pilferage has been taken into account.

5.4 Train Actuated Warning Device/Automatic Lifting Barriers

Reference: Kunzru (Recommendation No.7 of Part II); Wanchoo (Recommendation Nos. 162 & 163 of Part I, Recommendations Nos. 122, 123 & 124 of Part II); Sikri (Recommendation Nos. 103 & 104 of Part I, Recommendation Nos. 118 & 123of Part II)

5.4.1 The Kunzru Committee, adverting to methods of level crossing gate protection in use in Europe and America, recommended that Indian Railways should make

determined efforts to install fail-safe automatic barriers to suit Indian conditions, which would be automatically closed when a train is at a pre-determined distance from the LC gate. The Committee also suggested that the provision of bells and flasher signals at LC gates should be investigated by RDSO.

5.4.2 Despite the stand taken by the Railway Board that automatic half barriers were not suitable for Indian conditions, the Wanchoo Committee recommended that the Railways should continue experimenting with automatic half-barriers as a substitute for manned level crossings. However, with regard to the train actuated audio-visual warning device at unmanned level crossings, the Committee, in sharp contrast to the stand taken by the Kunzru Committee, expressed the view that such audio-visual warning was not of practical value in Indian conditions, and that the onus for safe passage across unmanned LCS should rest squarely with the road users.

5.4.3 The Sikri Committee recommended adoption of both automatic half- barters and the train actuated warning device (TAWD). The Committee felt that as the one trial Installation of automatic barriers on Northern Railway was sections away from metropolitan cities. The provision of TAWD was recommended in the first stage at all manned LCs in mid-section. Neither of these two recommendations was accepted by the Ministry of Railways on the grounds that these devices were unworkable in Indian conditions.

5.4.4 There has since then been a change in the Railways' thinking on the TAWD, quite obviously because of the increase in number of level crossing accidents, particularly at unmanned gates. It is understood that the TAWD with audio-visual indication has been sanctioned at 10 level crossing gates each on Eastern and Western Railways.

5.4.5 On the issue of TAWD, we have given our recommendations in Chapter III.

5.5 Overaged Signalling Gear

Reference: Kunzru (Recommendation No.86 of Part II); Wanchoo (Recommendation Nos 1) 173 & 174 of Part 1); Sikri (Recommendation No.124 of Part 1

5.5.1 The Kunzru Committee had observed that unless overhaul and replacement of lever frames and worn-out signalling gear are done according to the prescribed schedules, "signalling failures would continue to increase thereby reducing the factor of safety in rail operation."

5.5.2 The Wanchoo Committee had also stressed the importance of clearing the shortfall in replacement programmes for lever frames and block instruments. In July 1969, the Railway Board advised the Zonal Railways that whenever signalling equipment needed replacement on age-cum-condition basis, replacement should be carried out early so that safety was not compromised.

5.5.3 However, notwithstanding the guidelines issued by the Railway Board, there was further increase in the arrears of signalling gear due replacement, which prompted the Sikri Committee to state that the Wanchoo Committee's recommendations on the subject "not only remain unimplemented but there has been a distinct deterioration in the situation..... On the basis of instructions issued on the subject by the Railway Board to the Zonal Railways and considering the fact that "implementation was also of continuous nature", this recommendation was treated as implemented.

5.5.4 Our Committee has, in Chapter II, underlined the importance of replacing overaged signalling gear within a fixed timeframe. According to information furnished by the Ministry of Railways, there are at present 1560 stations where signalling gear are overdue replacement. When one considers that the Sikri Committee was sharply critical of the Railways for not ensuring timely replacement of signalling gear on account of which the Railways had accumulated arrears of 101 lever frames overdue replacement, the present status of signalling gear overdue replacement becomes a matter of grave concern. Our Committee once again reiterates the urgent need to pull up the arrears in replacement of signalling gear overdue replacement.

5.6 Separation of Warner from Outer Signal/Provision of Multiple Aspect Signalling

Reference: Wanchoo (Recommendation Nos. 133 & 134 of Part II); Sikri (Recommendation Nos. 108 & 109 of Part 1)

5.6.1 The Wanchoo Committee, while stressing the need to provide multiple aspect signalling at all stations on trunk routes and main lines, had recommended that as an interim measure, the warner should be separated from the outer signal and placed at a distance of 1.5 kms outside the outer signal so that the drivers of trains get a pre-warning before the first stop signal.

5.6.2 The Sikri Committee found that despite having accepted the recommendation of the Wanchoo Committee, there had been no significant progress in separation of warners from outer signals. The Committee also felt that the Railway Board needed to take up provision of multiple aspect signalling at the remaining stations on trunk routes and main lines as early as possible.

5.6.3 The Railway Ministry's written response to the Sikri Committee recommendation on the warner signal was not satisfactory. The Ministry stated that "Zonal Railways had not come up with a proposal of separation of warmer signal which indicated that they do not consider it necessary", implying thereby that even a recommendation that had been accepted could be implemented only if endorsed by the Zonal Railways. In reply to our questionnaire, the Zonal Railways (excluding South-Eastern and Western Railways) have indicated that there are still as many as 960 stations where the warner is placed below the outer signal. From these figures it is apparent that the Railways have not seriously addressed the issue of separating warners from the outer signals.

5.6.4 Our Committee has been advised that the entire 'A' route of Indian Railways has been provided with multiple aspect signalling. We would urge the Railways to provide multiple aspect signalling on the 'B' route within the next five years. This issue would be discussed in detail in our final report.

5.7 Track Renewals

Reference: Kunzru (Recommendation Nos. 16, 96, 97, 98 of Part II); Wanchoo (Recommendation No.141 of Part 1); Sikri (Recommendation Nos. 84 & 85 of Part 1, Recommendation No.71 of Part II)

5.7.1 In order to underline the importance of timely track renewals, the Kunzru Committee reproduced the following observation made by the Estimates Committee in their Twenty first Report, 1955-56: “the Committee are definitely of the opinion that topmost priority should be given to wipe out areas of track renewals. Endorsing this view, the Kunzru Committee felt that non- fulfillment of the track renewal programme on certain Railways was responsible for a large number of derailments due to

track defects. Apart from the implications on safety, track renewals would also reduce the length of track under speed restriction on the Railways.

5.7.2 The Railways responded positively to this recommendation by pulling up the arrears in track renewals, a fact noted with appreciation by the Wanchoo Committee which commended the progress made on track renewals. The Committee expressed the hope that the pace of renewals would be maintained.

5.7.3 According to the Sikri Committee, not only were the hopes of the Wanchoo Committee belied, "but the position has deteriorated considerably and its ill-effects are becoming apparent from the rising incidence of rail breakages and imposition of speed restrictions on increasing length of track." The Committee was concerned that the actual allocation of funds for track renewals was much less than the requirement, and emphasized the need to provide the full requirement so that the arrears are wiped out early. On account of the inadequate outlays, the backlog of primary renewals which was about 2400 Kms in 1974, had increased to about 6000 Kms in 1978. The Committee stressed that "requirement of funds for track renewals should be viewed by Government as an essential input for safety and should get commensurate priority." The Ministry of Railways treated this recommendation as implemented in 1986 with the following remarks: "Every effort was being made to allot maximum possible funds for track renewals, hence treated as implemented."

5.7.4 The fears expressed by the Sikri Committee that unless larger financial allocations for track renewals are made, the backlog will get totally out of hand, has now become a grim reality. We have already referred to the huge arrears in track renewal of more than 12,000 Kms, which excludes

loop lines and yard lines. It is clear that Railways is not in any position to bridge the gap from its own financial resources. As suggested by the Committee in Chapter II, the Central Government will need to lend a helping hand.

5.8 Ballasting

Reference: Kunzru (Recommendation No. 101 of Part II); Wanchoo (Recommendation No. 145 of Part I); Sikri (Recommendation No. 86 of Part II)

5.8.1 The Kunzru Committee attached high priority to the adequacy and quality of ballast as a means for ensuring safe and satisfactory behaviour of track. Even at that time the Committee recognized that with introduction of concrete sleepers and mechanical tamping, there was vital need for the right type and quantity of ballast. The Committee, however, observed that the recoupment of ballast on IR was extremely unsatisfactory and demanded vigorous action for ensuring a ballast cushion of 10" on important routes. For this purpose, it urged the Railways to ensure adequate supply of hoppers for training out ballast, motor trucks for collection of ballast on the cess, and installation of mechanical crushers at suitable locations.

5.8.2 The Wanchoo Committee noted that while the Railways had improved the training out capacity by increasing the fleet of hopper wagons, there was still a problem of shortage of ballast as also deficiency of clean ballast in many sections. The Committee felt that the Railways should increase the annual procurement of clean ballast to make good the shortfall. The Ministry of Railways treated this recommendation as implemented by stating that adequate availability of ballast was being ensured to meet the annual requirements for normal recoupment, track renewals, and for ensuring ballast cushion.

5.8.3 According to the assessment made by the Sikri Committee, the total quantity of ballast procured on all Railways from 1973-74 to 1977-78 averaged 2.68 million cubic meters per annum, which indicated that the procurement was not adequate even for recoupment. The Committee urged the Railways to ensure recoupment of ballast according to the accepted norms as also to streamline the working of ballast trains. The Ministry of Railways' response was that this recommendation had been already implemented in spirit."

5.8.4 Our Committee is aware that there are large stretches of track on Indian Railways having scanty ballast, with Zonal Railways reporting shortages varying from 15 to 35 percent. There is also a large percentage of "caked" ballast on track. Ballasting is a major problem and our recommendations on the subject are given in Chapter II.

5.9 Ultrasonic Testing

Reference: Wanchoo (Recommendation No.105 of Part II); Sikri (Recommendation Nos. 98, 99 & 103 of Part II)

5.9.1 Recognizing the limitation of visual examination of rails which cannot detect many defects, the Wanchoo Committee felt that ultrasonic rail flaw detectors were essential for checking of rails. The Committee recommended that the Railways should procure an adequate number of these devices. The periodicity of ultrasonic examination visualized by the Committee was annual testing, "though more frequent testing could be carried out where track conditions so warrant."

5.9.2 The Sikri Committee, citing increase in derailments due to rail fractures on IR during the period 1973-74 to 1977-78, urged the Railways to intensify ultrasonic testing of rails. This Committee made a number of invaluable suggestions to

improve the system of rail flaw detection which included the following measures:

(v) every new rail should be ultrasonically tested before being put on track;

(vi) schedules should be prescribed for testing of different types of track with ultrasonic rail flaw detectors;

(vii) provision of adequate number of rail flaw detectors on each division;

(viii) development of facilities for repair, maintenance and periodic calibration of the machines; (v) detectors to be provided with an arrangement for recording the flaws. It is significant that the Sikri Committee had highlighted all the most pertinent issues relating to ultrasonic testing. But it is unfortunate that the Railways are only now showing the necessary sense of urgency to streamline this critical activity. The recent catastrophe involving Golden Temple Mail and Sealdah Express near Khanna on Northern Railway in November 1998 and the accident of Godavari Express near Kazipet on South Central Railway in June 1999 have exposed the infirmities in the existing system of ultrasonic testing. Our recommendations on the subject are given in Chapter II.

5.10 Speed Recorders/Speedometers

Reference: Kunzru (Recommendation No.53 of Part I); Wanchoo (Recommendation No. 178 of Part 1 and Recommendation No. 183 of Part II); Sikri (Recommendation No. 192 of Part II)

5.10.1 The Kunzru Committee emphasized the importance of providing speed recorders along with speedometer as a means to deter drivers from over-speeding for fear of detection. The Committee recommended that speed-recorders be provided on Mail/Express trains and speedometers on remaining passenger trains "within a period of 2 years from now. It was suggested that engines of fast goods trains be also provided with speedometers.

5.10.2 The Wanchoo Committee was critical of the progress made on this front and urged the Railways to make determined efforts to indigenously manufacture more suitable and reliable type of speedometers-cum speed recorders.

5.10.3 The Sikri Committee noted with concern that "considering that the speedometer problem has been with the Railways for nearly 2 decades, we feel that there has been a lack of determined effort to develop a suitable speedometer/speed recorder indigenously." This recommendation was treated as Implemented in 1989, on the grounds that "supplies (of speedometers-cum-speed recorders) against the development order placed on M/s. Autometers had started."

5.10.4 Almost four decades after the provision of speed recorders was insisted upon by the Kunzru Committee, there are still huge gaps in the Railways' compliance on this issue in spite of the fact that there are now two Indigenous sources. To give but one example, our Committee learnt that out

of the 74 locos homed in Siliguri (MG) Diesel Shed, of which 53 are nominated for passenger services, only 3 locos have been provided with speed recorders.

In Lumding (MG) Diesel Shed, not a single loco in a holding of 55 locos has this provision. It is apparent that the Railways are still to provide this basic device on a large number of locomotives. Our Committee feels that the Railway administration should provide this facility on all locomotives without further delay.

5.11 Coaching Maintenance Facilities

Reference: Wanchoo (Recommendation No. 204 of Part II); Sikri (Recommendation No. 138 of Part 1, Recommendation No. 211 of Part II)

5.11.1 The Wanchoo Committee had underlined the importance of ensuring the provision of adequate number of washing lines and pit lines with the necessary facilities so that rakes are properly examined before their run. The Committee observed in the course of their inspections that the facilities for primary and secondary maintenance of rakes were not adequate. Some problems highlighted were shortage of pit lines, deficient drainage and poor illumination in the examination pits.

5.11.2 There was no substantive improvement in the position even 10 years later when the Sikri Committee reassessed the situation. The Sikri Committee made a pointed observation that the gap between the requirement and availability of maintenance facilities was widening. The Committee found that at a large number of stations the coaching rakes were not placed on the pit lines due to shortage of examination pits. Then there were problems of pits of Inadequate length, unsatisfactory lighting and poor drainage.

5.11.3 Even 20 years later, these basic facilities for ensuring proper attention to coaching trains are far from satisfactory. We have indicated our views on the subject in Chapter II and at this point would only reiterate that coaching maintenance facilities be provided in accordance with the prescribed norms on an emergent basis.

5.12 Neutral Control Organization

Reference: Kunzru (Recommendation Nos. 143, 144, 145 of Part II), Wanchoo (Recommendation Nos. 233 & 234 of Part 11); Sikri (Recommendation No. 137 of Part-1)

5.12.1 The Kunzru Committee lauded the positive role played by the Neutral Control Organization in ensuring the quality of work done in the workshops and sick lines. The Committee commented adversely on the high percentage of rolling stock that were rejected by the NCO which was "an ominous pointer to the unsatisfactory work done in the workshops." The Committee also recommended that the system of neutral control examination, which was effective in exercising a check on maintenance of rolling stock be extended to cover a greater number of workshops and sick lines.

5.12.2 The Wanchoo Committee was emphatic that the neutral control organization served the very useful purpose of keeping rolling stock in good fettle and stressed the need to ensure that "nothing is done to weaken it in view of its independent character."

5.12.3 The Sikri Committee was sharply critical of Railways for turning out rolling stock without certification by neutral TXR at the nominated NTXR points. The Committee also underlined the importance of ensuring that rolling

stock was turned out from workshops and sick lines after completion of al stipulated repairs.

5.12.4 To test the degree of compliance of the earlier Committees recommendations on the subject, we made a detailed study of the IRCA Report for the quarter ending June 1998. The report has many examples of rolling stock being turned out with rejectable defects. A simple statistic brings out the state of affairs. In the quarter April-June 1998 reviewed, out of 5747 coaches turned out by the nominated workshop subjected to NTXR check, as many as 2158 coaches with rejectable "defects having safety implications" were "ca passed by the workshop authorities overruling the objections of the NTXR. The recommendations of the earlier Committees regarding attention to deficiencies pointed out by NCO remain substantially unimplemented. Our committee has given detailed comments on this subject in Chapter III.

5.13 Delay in Recruitment through Railway Recruitment Boards

Reference: Kunzru (Recommendations 48 & 49 of Part II), Wanchoo (Recommendation 120 of Part I), Sikri (Recommendation 21 of Part II)

5.13.1 The Kunzru Committee had referred to persistent shortages in several categories of staff due to the delays inherent in the procedure of recruitment through the Railway Service Commissions (RSCs) now called Railway Recruitment Boards. In this connection the Committee made certain suggestions for streamlining the working of RSCS. In response, the Railway Ministry prescribed a time schedule from the date of receipt of an indent by an RSC until finalization, which was 5 months in the case of technical categories, 7 months for

non-technical categories and 75 days in the case of probationary ASMS.

5.13.2 The Wanchoo Committee observed that the time limits prescribed by the Railway Board for finalization of selections by the RSCS, had often been exceeded.

5.13.3 The Sikri Committee was also critical of the inordinate delays in finalizing selections through the RSCs and recommended streamlining the recruitment procedure "so as to make available candidates as soon as vacancies arise. This recommendation was treated as implemented on the basis of the following general statement furnished by the Railway administration: "The time lag between arising of a vacancy and actual recruitment against the vacancy was being reduced at that time."

5.13.4 Our analysis shows that hardly any dent has been made in reducing the delays in finalizing selections through the RRBs (earlier RSCs) as evident from the information furnished by some RRBs which is reproduced below:

RRB'S Name	Category/ Post	Year of Indent	Date of Indent	Date of sub-mission of Panel
Mumbai	Prob. ASM	1994	30.6.94	23.1.96
			07.4.94	23.1.96
	App Asst Driver (DSL/ Elec.)	1994	11.7.94	22.5.96
			15.6.94	22.5.96
			09.3.95	06.2.96
	Prob. ASM	1995	28.11.95	10.7.97
			02.8.95	10.7.97
Bangalore	ASM		16.10.95	05.12.96
	DSL Asstt.		10.4.96	24.6.97
	ASM		16.8.96	20.8.97

Guwahati	Appr JE(Sig) Gr II	1996	18.1.96	3.3.98
	Appr SI/Gr. II	1996	18.1.96	26.3.98
	Appr. CTXR	1996	18.1.96	26.3.98
	Appr. TXR	1996	18.1.96	26.3.98
	ASM	1996	05.9.96	09.1.98
Chandigarh	ASM	1996-97	25.7.95	25.9.96
	Asst. Driver (DSL/Elec)	1997-98	01.6.93	08.8.97
Ahmedabad	App. Asstt. Driver (DSL/Elec)	1994-95	22.3.94	2/3.8.95
	Prob. ASM	1995-96	07.9.95	08.3.97
Patna	Tr. Asst. Driver Elec.	1995-96	13.11.95	26.12.97
	Asstt. Driver DSL	1996-97	22.8.96	11.7.97
	Tr. ASM	1996-97	04.11.96	11.7.97
	Asst. Driver	1996-97	04.11.96	11.7.97
	Tr. ASM	1996-97	02.1.97	22.9.97
Malda	Tr Asst. Driver (Elec.)	1996-97	13.11.95	05.2.98
	Tr. Asst. Driver	1997-98	22.08.96	Written Test held on 22.3.98. Result suspended

5.14 Psycho-Technical Cell and Psycho-technical Research

Reference: Kunzru (Recommendation 36 of Part I); Wanchoo (Recommendations 129, 130 of Part 1, Recommendation 44 of Part II); Sikri (Recommendations 46 47 Part 1, Recommendation 20 of Part II)

5.14.1 The Kunzru Committee had first mooted the idea of applying psychotechnical tests to a limited number of drivers, cabinmen and levermen before selection to these posts. In pursuance of this recommendation, the Railways set up a psycho-technical cell which conducted job analysis with a view to standardizing tests for a few select categories of staff.

5.14.2 The Wanchoo Committee, while endorsing the value of psycho-testing as a means to promote safety in train operation, felt that the application of tests in selection of personnel should be expedited by the Railways. The Committee also recommended that the scope of the cell be enlarged "to encompass the broader problems of socio-psychological make-up of the railway worker and of human engineering." By 1972 the test batteries had been developed and applied to some key categories of staff both at the stage of initial recruitment and also in service".

5.14.3 The Sikri Committee was of the view that not much progress had been made in enlarging the scope of activities of the psycho-technical cell in the area of labour-science research. The Committee stressed the importance of bringing within the purview of the psycho-technical testing those Class IV staff who, by promotion, would occupy jobs that have a vital bearing on safety. The Committee further urged the Railway administration to strengthen the Psycho-Technical Cell by improving the promotional prospects of the officials manning the Cell.

5.14.4 Although psycho-technology has made rapid advances and is today recognized as a key ingredient of human engineering in the work place, and an invaluable diagnostic aid for identifying aberrations in psychological make-up and behaviour, the overall progress made

in psycho-technology on IR has not been encouraging. The psycho-technical cell has conducted a few studies on problems of front-line staff, particularly drivers. The impact of psycho-technology has so far been only marginal. In Chapter-II we have indicated some of the shortcomings in the existing set-up. Our committee is of the view that the top management of the Railways will need to devote much greater attention than hitherto, to make the psycho-technical cell a truly professional outfit that is capable of finding solutions to the psychological and human behaviour problems on IR.

5.15 Running Rooms

Reference: Kunzru (Recommendation No.81 of Part II), Wanchoo (Recommendation No. 78 of Part II), Sikri (Recommendation No. 58 of Part II)

5.15.1 Recognizing the critical role of the driver in ensuring safety, the Kunzru Committee had stressed the importance of setting up suitable running rooms and "early completion of standard facilities in all of them." This recommendation was treated as implemented on the grounds that "the Railways have generally provided essential facilities." The Railway administration avoided commenting upon provision of "standard" facilities in the running rooms.

5.15.2 The Wanchoo Committee was also of the view that much needed to be done to make the running rooms adequately comfortable. The Committee felt that the prescribed yardsticks for provision of amenities in running rooms-

"Should be rigidly applied in order to ensure that adequate facilities are available for the comfort of the running staff."

5.15.3 The need to provide the right kind of environment for the running staff to take rest at outstations also engaged the attention of the Sikri Committee, which was very specific about the facilities to be provided in the running rooms. Apart from recommending individual cubicles, the Committee called upon the Railway administration to provide basic necessities ties like clean linen, mosquito nets, adequate water supply, improved sanitary conditions This recommendation was treated as implemented on the basis of various instructions issued by the Railway Board on the subject.

5.15.4 We have already referred to the state of the running rooms in Chapter 11. We would urge the Railway administration to make the improvement of running rooms a corporate mission.

5.16 Duty Hours of Crew

Reference: Kunzru (Recommendation No.42 of Part I); Wanchoo (Recommendation No. 119 of Part I); Sikri (Recommendation No.64 of Part I)

5.16.1 A constant and persistent source of friction between Railway management and labour has been disagreement on duty hours for the running staff. While most categories of Railway staff were covered by the Hours of Employment Regulations, 1931, running staff were initially kept out of its purview apparently due to operational considerations and the open-ended nature of their duties. It was only in 1951 that running staff were brought under the HOER as a result of the recommendation made in the Adjudication Award given by Justice

Rajadhyaksha, who placed a limit on the "running duty" but excluded the pre-departure and post-arrival detentions. Thereafter, the Railway management has been progressively reducing the rostered duty hours of running staff.

5.16.2 The Kunzru Committee expressed concern that in many cases the actual duty hours of goods train drivers exceeded the rostered hours and desired that the Railways take steps to improve the situation. The Wanchoo Committee was also critical of the Railways' failure to make sufficient headway in keeping the duty hours of running staff within the prescribed limit. Although this recommendation on duty hours of running staff was treated as implemented, the actual situation on the ground provoked the Sikri Committee to state that the recommendation still remained to be implemented. The Sikri Committee further stated that it was "unfortunate that in a matter that has a direct bearing on safety the action taken so far has been tardy.

5.16.3 According to the extant instructions, the overall duty at a stretch of running staff from "signing on" should not ordinarily exceed 12 hours. Indicating the present status of implementation of the recommendation on duty hours of running staff, the Railway Board has stated that in the period January to June 1998, "the overall duty is being completed within 12 hours from "signing on" on all the Railways except Southern and South Eastern Railways who have been advised to improve the position" However, the position furnished by the Zonal Railways to the Committee is as under:

Incidence of longer hours on duty of Drivers 'C' for the year 1997-98 railway-wise

Railway	Total No. of Trips by Drivers 'C'	No. of trips between 10-12 hrs overall duty	No. of trips between 12-14 hrs overall duty	No. of trips between 14-16 hrs overall duty	No. of trips over 16 hrs overall duty
CR	118288	15125	6483	2271	0
ER	160345	149952	6837	3556	0
NR	281139	261029	11000	4720	4390
NE	22637	2478	2289	1145	381
NF	46104	10382	3037	1742	0
SR	108001	16376	6970	17521	0
SC	216585	26409	11652	26002	0
SE	353703	58644	26391	47345	23673
WR	168929	23919	16493	9745	302
TOTAL	**1475731**	**564314**	**91152**	**114047**	**28746**
Percentage	**100.0**	**38.2**	**6.18**	**7.73**	**1.95**

5.16.4 **Our committee is of the view that the Railways should make greater efforts** to reduce the incidence of longer hours on duty of running staff. This subject will be taken up in detail in the Final Report.

5.17 Status of Divisional Safety Officer and Tenure in Safety Organization

Referenre: Wanchoo (Recommendation No 331 of Part II); Sikn (Recommendation Nos 243 & 245 of Part II)

5.17.1 The Wanchoo Committee had expressed itself strongly in favour of having the post of DSO in the same grade as other divisional officers so that the DSO was able, by virtue of his status, to "carry weight with his counterparts in the other departments This recommendation was reiterated by the Sikri Committee which felt that the relatively junior status of

the DSO compared to his colleagues in the other disciplines was a major handicap as he was not able to impose any kind of discipline on the other departments even on issues directly linked to safety. The Sikri Committee was also in favour of a minimum of 2 years' tenure for persons posted to the Safety organization.

5.17.2 Our committee finds that these two recommendations remain substantially unimplemented by the Railways. There are as many as 39 divisions on the Indian Railways where the DSO is in Senior Scale whereas the other branch officers are in the Junior Administrative grade. And judging by the actual position on the ground, it would appear that the Railways have altogether forgotten about ensuring a minimum tenure of 2 years for persons posted to the safety organization. To cite a few examples, the post of Chief Safety Officer of South-Central Railway has had 20 incumbents in the period 1988-89 to 1997-98, on the Northern Railway 17 incumbents and an equal number on the North-Eastern Railway during the same 10 year period.

5.17.3 We have indicated our recommendations on the subject in Chapter III.

5.18 Delay in Finalization of Accident Enquiries & Disciplinary Action

Reference: Kunzru (Recommendation No. 49 of Part 1, Recommendation No. 65 of Part II); Wanchoo (Recommendation No. 133 of Part 1); Sikri (Recommendation No.40 of Part I)

5.18.1 The Kunzru Committee had expressed itself strongly in favour of prompt punishment of railway staff who were guilty of lapses leading to accidents. The Committee felt that punishment must inevitably be meted out for an unsafe act or breach of rule, but the Committee warned that if

punishments were delayed, the deterrent effect was lost. The Committee urged the Railways to conform to the targets laid down for finalizing accident cases and disciplinary action thereon.

5.18.2 The Wanchoo Committee found that the time taken for finalization of accident cases was far beyond the target prescribed. Ten years later, the Sikri Committee passed the verdict that this recommendation remained substantially 124 unimplemented as time taken by the Railways for finalization of accident cases exceeded in all cases the target laid down by the Railway Board

5.18.3 Though there has been a substantial improvement in the position since then, as seen in the figures given below, there is still considerable scope to effect improvement.

Year	No. of accidents	No. of cases in which inquiry has been completed including award of punishment within D+90 days	No. of staff held responsible	No. of staff finally awarded punishments	No. of enquiries pending finalization beyond D + 120 days
1993-94	674	344	912	879	49
1994-95	604	233	787	734	70
1995-96	440	210	537	508	64
1996-97	426	205	540	483	52
1997-98	420	198	582	467	66

5.19 Conclusion

5.19.1 In retrospect, we have traced the trajectory of the important topical recommendations made by the three earlier Committees and examined the nature of the Railways commitment to implement the accepted recommendations. The conclusion we draw is that there is scope for better implementation of the accepted recommendations of the

various Committees. While it is acknowledged that constraint of funds has been a hindrance, our committee has identified a number of frailties in the Railway management's response to the earlier Reports, not with the purpose of fault finding but to help reorient the entire corporate approach so that more productive results are achieved in the future.

5.19.2 Our Committee is convinced that an essential prerequisite for ensuring that key safety issues remain an integral, critical part of the corporate vision is to set up a proper monitoring mechanism to oversee the compliance of the recommendations made by vanous Committees on rail safety and the very first recommendation has been given in Chapter II to that effect

5.19.3 The complete recommendations of the Sikri Committee juxtaposed with remarks furnished by the Ministry of Railways regarding implementation are given in Appendix A.

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SUMMARY OF RECOMMENDATIONS

1.0 Implementation of Safety Matters

1.1 Implementation of accepted recommendations of Railway Accident Committees should be regularly reviewed and monitored at various levels once in two months. Paras 2.2.1 & 2.2.2

2.0 Safety Projects

2.1 Decisions on safety projects should cover the items completely in all aspects like funding, time schedules, actions, accountability, etc. over several years. Para 2.3.1

3.0 Railway Recruitment Boards

3.1 The posts of Chairmen of the RRBs should be filled up only by serving Railway Officers in SAG who have an outstanding record of service and impeccable integrity. Para 2.5.6 (1)

3.2 The appointment of the Chairman, RRB, should be ratified by UPSC. Para 2.5.6 (ii)

3.3 The tenure of the Chairman, RRB, should be three years instead of six years at present. Para 2.5.6 (iii)

3.4 To attract talent, the Chairman, RRB, should be entitled to a special allowance equivalent to 40 percent of basic salary. Para 2.5.6 (iv)

3.5 Ad-hoc appointments to the post of Chairman, RRB, should

be dispensed with, and in case of a vacancy, the Chairman of the adjoining RRB should be asked to look after temporarily. Para 2.5.6 (v)

3.6 The RRBs should work towards full computerization in their selection process to achieve complete objectivity, transparency, and speed. Para 2.5.6 (vi)

3.7 There should be immediate upgrading and revalidation of the psychological tests, and this should be a periodic feature. A competent external professional agency should be asked to do it within the next six months. Para 2.6.3 (1)

3.8 The Railways should, in the next three years, switch to a computer-based test package for both psycho-test administration and evaluation. In this connection, we would suggest that a multi-disciplinary team of Railway Officers should visit the psycho-testing centers of advanced Railway systems such as SNCF, France and Virgin Railway Company, UK. Para 2.6.3 (ii)

4.0 Criteria for Recruitment/Promotion

4.1 Henceforth, for any job on the Railways, the minimum educational qualification should be matriculation. Para 2.7.1

4.2 Certain changes in criteria for recruitment/promotion for certain safety category posts as recommended in Para 2.7.2.

4.3 In case there is shortfall in promotions through LDCE, the unfilled quota will be added to direct recruitment quota. Para 2.7.3

5.0 Training

5.1 Teaching allowance should be fixed at 40 percent of the basic

salary in all Railway training institutions as this will help draw individuals of high calibre to take up these critical assignments. Para 2.9.4

5.2 As a small incentive, the trainees should be provided free food during the period of training in addition to normal DA. - Para 2.9.5

5.3 Successful completion of training course should be linked to promotion/increment. Para 2.9.6

5.4 When any staff belonging to a safety category becomes over due for refresher training, he should be taken off duty until such time as he completes the training. Para 2.9.6(1)

5.5 Attributes required for a trainer should be carefully observed during the training courses and noted in the trainee's personal record to facilitate future selection as trainers. Para 2.9.6(ii)

5.6 The training courses for officers and supervisors should contain a capsule on "how to conduct accident enquiries". Para 2.9.7(1)

5.7 Yoga and meditation lessons should be imparted to trainees in all the training institutions. Para 2.9.7(ii)

5.8 In order to upgrade the skills of existing staff, they should be given liberal incentives to join ITI Courses, with Railways even reserving seats in reputed II institutions for deserving Railwaymen. Para 2.9.8

5.9 All staff belonging to the technical categories who are enrolled in a recognized ITI Course should be granted study leave with full pay and allowances for the duration of the course. Para 2.9.8

5.10 Competency-based training and certification should be introduced, in stages, in work-centers such as TXR Depots, Sick

lines, ROH Depots, Workshops, Flash Butt Welding Plants etc. Only those possessing certificates of competency should be allowed to work on the identified safety critical assemblies. Para 2.9.9

5.11 An all-India body like IRCAMTECH may be entrusted with the task of providing certification of the competence of teachers/trainers so that uniform and adequate standards are enforced. Para 2.9.10

6.0 Technical Aids

6.1 A reliable Train-Radio Communication facility between driver, guard, ASM, level crossing gate and approaching trains should be provided as a first step within 3 years on 'C' and 'A' routes and in another three years on 'B' route. Once optical fiber backbone is in place, the communication facility should be extended to control office. The system should have in-built call override, broadcast, and SOS facilities. Para 2.11.1

6.2 A suitable Train Protection and Warning System should be adopted with the features mentioned in Para 2.12.1.

6.3 Development of a Balise-based TPWS having the features as enunciated in para 2.12.1 should be taken up immediately by Indian Railways. Para 2.12.4 & Para 2.12.5

6.4 Complete station track circuiting should be done according to the priorities and time frame indicated in Para 2.13.1.

7.0 Drivers

7.1 The uniform of the drivers should be upgraded which will

help to instill in them a sense of pride. Para 2.14.2

7.2 Running Rooms should be provided with the amenities indicated in para 2.14.3.

7.3 Any driver overdue refresher training should be treated as being without a licence to drive and taken off driving duties. Such a driver should also be deprived of any allowance concerning driving until he joins the refresher course. Para 2.14.4

7.4 It is necessary that apart from the conventional methods of lecturing to the trainees, interactive training with personal computers should be introduced on lines similar to that available in some of the advanced railway systems such as in the Drivers' Training Centre, Fulda in Germany. Para 2.14.5

7.5 Action should be initiated forthwith so that within next one year IR has 16 simulators. Para 2.14.6

7.6 One of the trips during road learning should be in the night hours between 2000 hrs and 0600 hrs as the experience of driving at night is altogether different from day time driving. Para 2.14.7

7.7 The approach adopted by Southern Railway for dealing with 'C category drivers may be adopted countrywide. Para 2.14.8

7.8 It is important to make the LI accountable in case it is found that the driver's grading was not done appropriately. Para 2.14.9

7.9 Special 'A' grade drivers having requisite qualifications should be eligible to appear in the Limited Departmental Competitive Examinations for AME/AEE just like motormen. Para 2.14.10

7.10A register to record driver's observations during his run must be maintained in all lobbies and this information should be conveyed to Traction/Power Controller under exchange of private numbers. The Power/Traction Controller should in tum convey

these observations to their respective counterparts of the concerned departments under clear acknowledgement. The observations of the driver as conveyed by the Power/Traction Controller to the respective counter parts of the concerned department should be faithfully recorded in the register dedicated for this purpose. Follow-up action taken should be recorded within 24 hours which should be monitored by the Divisional officers as well as Divisional Safety Officer. The information regarding action taken on the reported defect should be conveyed back to the lobby for information of the driver so that he has confidence that action has been taken on his observation. Disciplinary action should be initiated against the concerned supervisors in case the same defect resurfaces within the next 72 hours Para 2.14.11

8.0 "Doctored" Statistics

8.1 The Railway management should immediately correct all distortions in compilation of accident and other safety related statistics. No comparison need be made with past statistics as the two sets of figures would be incompatible. Para 2.15.8(1)

8.2 It should also be made clear to officials down the line that an act of suppression of any accident or asset failure will be viewed to be as grave an offence as being responsible for causing an accident. Para 2.15.8(ii)

8.3 A Gazette Notification bringing out recommendations mentioned in Para Nos. 2.15.8(1) and 2.15.8(ii) should be brought out to publicize these instructions. Para 2.15.8 (iii)

8.4 The concerned Station Master must issue, as per rules, an all

concerned written message regarding accident within 12 hours. Otherwise, it will be considered as a failure on his part. Para 2.15.8(iv)

8.5 Within one hour of occurrence of the accident the Control Office should record the details in a standard format, preferably on computer which is networked with Headquarters and Railway Board. The system should be such that deletion of an entry is not possible. Para 2.15.8(v)

9.0 Procurement of Safety Items

9.1RDSO should be assigned the task of preparing a comprehensive list of safety items within the next three months to be used by all Zonal Railways and Production Units. Para 2.16.2

9.2RDSO should be entrusted with the task of drawing up a region-wise vendor list for safety items. This approved list should indicate the production capacity of the firms so that adequate number of vendors are approved. RDSO should also develop a system of getting feed-back from the consumers and rate the vendors periodically for retention in the list. For this purpose proper identification marks of the manufacturer should be legibly embossed on components. Para 2.16.5

9.3 The Railways should take recourse to rate contracts for fast moving components and authorize officers in charge of the depots to operate them. Para 2.16.6

9.4 Items specified in the Safety List should get overriding priority in procurement. Nonstock items declared necessary for safety by the concerned PHOD should also get similar over-riding priority. Para 2.16.7

9.5 Since the cost of safety spares forms only a fraction of the

total budget for spares, availability of funds certificate should not be required. The concerned PHOD will, however, ensure that total budget is not exceeded. Para 2.16.7

9.6 A reputed Management Consultancy agency of international repute should be assigned the task of simplifying the procurement procedures on IR and studying the options of changing over to a system of long-term contracts. Paras 2.16.8 & 2.17.3

10.0 Renewal of Assets

10.1 Pulling up the backlog in arrears in renewal of track, bridges, rolling stock and signalling gear should be the prime focus of the Railways. At all times there should be a time-bound plan to clear the arrears as also the fresh accurals. Para 2.18.2

10.2 In the interest of Railway safety, the Central Government should provide a one-time grant to the Railways so that the arrears in the renewal of track, bridges, rolling stock and signalling gear are wiped out within the time frame specified by this Committee - Para 2.18.3

10.3 Projects which are financially and operationally not justified but are taken up for other reasons should be fully financed outside the Railway Budget and should be exempt from the payment of dividends. Para 2.18.3

11.0 Overaged Signalling Gear

11.1 Over aged signalling gear should be replaced as mentioned in Para 2.18.4.

12.0 Track Renewals

12.1 Railways should pull up all arrears of track renewal in a time-span of seven years. Para 2.18.6

13.0 Distressed Bridges

13.1 Within one year all bridges that are today declared as "distressed" and others over 100 years in age, or of early steel, should be subjected to a super check by a task force, on each Railway, headed by a specially selected senior administrative grade officer for quick structural assessment and immediate remedial action. Each Task Force should be equipped with state-of-the-art non-destructive testing equipment now available. The project should be coordinated by the RDSO Para 2.18.11

13.2 The rehabilitation/rebuilding of distressed bridges should be accorded a high priority on par with track renewals. Para 2.18.11

13.3 The rehabilitation of "distressed" bridges should be completed in a time span of 5 years along with fresh accruals. Para 2.18.11

14.0 Phasing out of Unreliable Wagons

14.1 The Overaged coaches should be phased out in five years. Para 2.18.14

14.2 CRT wagons should be withdrawn from commercial use. - Para 2.19.1

14.3 Considering the condition of the BOX fleet and their

unreliable performance, the Committee recommends that their codal life be reduced to 25 years. Para 2.19.3

14.4 The CRTS (till withdrawn) and four-wheeler tank wagons which are derailment-prone should preferably be utilized only on single line routes to avoid the possibility of major disasters. Para 2.19.5

15.0Rail/Weld Fracture

15.1A group headed by a senior administrative grade IR officer of impeccable credentials should take over inspection and certification of quality of rails. Para 2.20.2

15.2A The Working Group set up by Railways to revise manual for USFD testing of rails/welds, supported by eminent outside experts, should complete its work in six months, including development of new procedures and prototype equipment which should not necessitate traffic blocks. Para 2.20.6(i)

15.3A New USFD equipment should be procured having a computerized recording device to enable exhaustive analysis of defects and to identify those which are growing in size Para 2.20.6(ii)

15.4 The "need based" concept of USFD testing of rails/welds should be implemented straightaway as a parallel action to the development of new equipment/procedures. Para 2.20.6(iii)

15.5A modern recording car based USFD rail/weld check system along the lines of German Railways should be adopted as soon as possible. Para 2.20.6(iv)

15.6 To overcome a number of rail/weld fractures caused by

over-loading wagons and hammer blow due to wheel flats, action should be taken as mentioned in Para 2.20.7.

15.7IR should, within one year, obtain the latest technology of THERMIT welding and procure state-of-the-art equipment for testing each THERMIT weld. Para 2.20.8(i)

15.8 Railways should set up a Welding School close to RDSO, Lucknow, along the lines of German Railways. This institution should cover all aspects such as training, licencing staff, testing equipment, technology transfer, etc. - Para 2.20.8(ii)

15.9A Record should be kept of all fracture gaps and cuts in LWR along with rail temperature. From this the maximum stress occuring in the LWR should be computed and appropriate action taken. - Para 2.20.9(i)

15.10A Record of behaviour of LWRs should be maintained along the same lines as for bridges, with checks at several levels with necessary certification. Para 2.20.9(ii)

16.0 Maintenance of Rolling Stock

16.1 Adequate and standard maintenance facilities should be provided at all coaching depots on the highest priority. Para 2.21.5(a)(i)

16.2A task force should be appointed to identify the shortcomings in the coaching depots, work out the investment required and produce a time-bound plan within a period of six months. Para 2.21.5(a)(ii)

16.3 No new train should be introduced till the concerned Commissioner of Railway Safety has certified the adequacy of maintenance infrastructure and man power. Para 2.21.5(a)

16.4 Railway management should immediately work towards upgrading the facilities at all major freight train examination points. Railways must identify the shortcomings and draw up a time bound plan for upgradation within six months. Para 2.21.5(b)

17.0 Maintenance of Track

17.1 On routes where mechanized maintenance has been introduced, adequate blocks - preferably of the duration of 4 hours - should be given. During these blocks several departments should co-ordinate and take up works concerning OHE, signalling, etc besides track maintenance. Para 2.22.3

17.2 Preventive maintenance facilities for track machines be set up within the next 3 years. Para 2.22.4

17.3IR should progressively switch over to mobile maintenance units on the lines of Konkan Railway with self-propelled rall vehicle, off track tampers (for spot attention) and other equipment instead of conventional P-way gangs, so as to cover 'A' route in the next 5 years. Para 2.22.5

17.4IR should introduce cyclic maintenance and periodical renewal of elastic fastening system of concrete sleeper to reduce the problems being faced in maintenance of LWR. Para 2.22.6

17.5 Railways should make a precise assessment of the ballast shortage and plan to clear the same in 5 years along with yearly accrual; immediately raise or partially screen stretches of track with contaminated ballast to provide a clean top layer as an interim measure pending final attention; introduce a system of track gangs providing cross drains in alternate cribs filled with clean ballast along with cess cutting to prevent water logging; and

develop major sources of hard ballast and curtail procurement of soft stone in the next 5 years. Para 2.23.5

17.6 IR to make an assessment of the total hopper wagon requirement and ensure that required numbers are provided to the Zonal Railways in the next three years. Para 2.23.6

18.0 Peripheral Activities

18.1 On The Ministry of Railways should, as a mark of respect to the dead and Injured in various train accidents, announce an immediate and complete moratorium on all types of celebratory and ceremonial functions for, at least, the next three years and dedicate this period whole-heartedly and completely to improving safety on the Railways. Para 2.24.1

19.0 Departmentalism

19.1 Railways should immediately engage a management Consultant of international repute who should study the issue of departmentalism and other managerial issues in depth along with a panel of carefully selected railwaymen. Paras 2.25.3 and 2.25.4

20.0 Corporate Safety Plan

20.1 Railways should immediately make out a comprehensive corporate safety plan which will, interalia, clearly state the safety policy/objectives and strategies for achieving them; unambiguously enunciate the basic tenets and requirements of safety; prioritize the safety related works and indicate the timeframe as also investments proposed; and set bench marks for safety achievements. 2.26.4 Para

21.0 Supervisors as Members of Unions

21.1 Supervisors should not be allowed to join the unions. They should be permitted to form their own association to represent their interests and grievances. Para 3.2.3 & 3.2.4

22.0 Transfer of Union Officials

22.1 In the case of transfers of union officials, it should be sufficient to give the trade unions notice of 3 months, to enable alternative arrangements being made. The transfer should have the approval of an officer one level higher than the one ordinarily competent to order the transfer. Para 3.2.5

23.0 Simplification of Rule Books

23.1 Railways General Rules 1978, as also other manuals should be revised and updated as necessary. Para 3.3.3

23.2 All manuals containing rules for the different categories of staff associated with safety should be available in the vernacular languages, apart from Hindi and English, but as separate books. Para 3.3.4(1)

23.3 Each correction slip should be issued, after incorporation, in a replacement page instead of the untidy, book-marker type correction slips currently in vogue. Para 3.3.4(ii)

23.4 A comprehensive Accident Manual applicable to the Indian Railways should be framed. This should include all aspects of Disaster Management. Para 3.3.4(iii)

23.5 Railways should immediately work towards ensuring uniformity in the types of authority and procedural forms issued in day-to-day train working. Para 3.3.5

24.0 Empowerment of Supervisors

24.1 Supervisors in scale Rs 6500-10500/- who exercise establishment powers should have most of the disciplinary powers which are at present with Junior Scale Officers. Para 3.4.2(i)

24.2 Because of their position in the hierarchy and nature of their duties involving supervision of senior ranking Class III employees, the posts of the Lis and Tis should only be in the two highest supervisory grades viz. Rs.6500-10500/- and Rs. 7450-11500/-. Para 3.4.2(ii)

24.3 Supervisors should be given the powers to grant on-the-spot cash awards up to a maximum of Rs.100/- to staff under their control subject to a maximum of Rs.2000/- per year. Para 3.4.2(iii)

25.0 Inspections

25.1 Supervisors For the guidance of the inspecting officials, detailed check-lists for various types of inspections need to be made out. Para 3.5.1(i)

25.2 Every item contained in the check list is required to be covered after a specified period by designated levels and record maintained of each item. Subsequent inspections should target rectification of shortcomings noticed earlier, maintaining necessary records. - Para 3.5.1(ii)

25.3 Apart from these detailed inspections, other field visits of

the inspecting officials should be focused on random check of some items out of the checklist, in addition to action taken on previously noticed shortcomings. Para 3.5.1(iii)

25.4 Periodically, each department should undertake special Safety Audits which should be conducted by a special team reporting to the PHOD/DRM. Para 3.5.1(iv)

25.5 The number of inspections to be conducted by an individual should be inversely proportionate to his position in the hierarchy. Para 3.5.2

26.0 Neutral Control Organization

26.1 Mechanical Directorate should clearly spell out those defects which have serious implications on safety, and if any rolling stock is rejected by the NTXR on account of such a defect, there should be no authority at any level on the Railway to permit turning out of that rolling stock from the workshops without rectification. In the event of rolling stock being rejected on account of non-availability of material, the concerned stores officers should put up an explanation for the failure to the administration. Para 3.6.3

27.0 Permanent Way

27.1 UIC specifications universally used by developed countries for rails should be adopted by IR. Para 3.7.2

27.2 Lubrication of gauge-face should be done on curves, points and crossings, weak track, track work sites, and on bad formations, as these are locations where wheel-mounting derailments occur. Para 3.8.1(1)

27.3 Regular periodic measurement of toe-load of the fastening should be taken up systematically so that bad stretches requiring out-of-turn attention can be quickly identified and rectified. Para 3.8.1(ii)

27.4IR should procure laser-based track recording cars that will measure track geometry with precision and accuracy at reasonably high speeds. Para 3.8.1(iii)

27.5 Reliable communication should be available between the engineering worksite and the station staff on either side of the work spot. Para 3.8.1(iv)

28.0 Locomotives

28.1 Provision of an emergency button suitably located in the driver's cab should be made which, when pressed, will: (1) cut off power of the loco; (ii) put on the flasher lights; (iii) set off an emergency siren; (iv) shoot flares in the sky; and (v) send an SOS signal on the mobile train radio, if available. Para 3.10.2

28.2 Flasher lights on locomotive should be much more prominent as compared to the existing one. Para 3.10.3

28.3 Considering the critical importance of the audio-visual warning device in emergencies involving passenger distress and generation of wheel flats, Railways must, without further delay, ensure that the system of through wiring in the coaches to activate this device is restored. Para 3.10.4

28.4 It is imperative that all locomotives, without exception, are provided with reliable speed recorders with digital memory. Micro-processor- based speed recorders should be developed which not only record speed, distance, and time, but also activities

like brake application, throttle position, use of whistle, etc. Para 3.10.5

28.5 Air driers should be fitted on all existing and new diesel/electric locomotives. Para 3.10.6

29.0 Coaching and Goods Stock

29.1 Railways must immediately research an alternative to dashpots and Install it in three years. Para 3.11.3(1)

29.2 All new coaches must be fitted with bogie-mounted brakes, and retrofitment on existing fleet should be completed in five years. Para 3.11.3(i)

29.3 Fitment of air springs should be statutory for EMU stock and this should be completed in five years. The Railways should also examine the possibility of fitting them on other coaching stock. Para 3.11.3(iii)

29.4 Considering their crucial implications, the critical rubber components should be manufactured by the Railways in-house, by developing the required wherewithal, in some of the Railways' existing manufacturing units. Para 3.11.3(iv)

29.5 Railways should quickly switch over to self-steering bogies which reduce wheel flange wear besides exerting very low flange forces on the track. Para 3.11.4(1)

29.6 Railways should introduce ferritic stainless steel on the open wagons to reduce corrosion, Para 3.11.4(ii)

29.7'F' type couplers, which are robust, have little wear and reduce chances of uncoupling in accidents, should be introduced early Para 3.11.4(iii)

29.8 Composite brake blocks which are non-pilferable and can last from ROH to ROI should be inducted on priority. - Para 3.11.4(v)

29.9 The Railways must examine the feasibility of having bogle mounted brakes on wagons which will reduce brake nagging and associated problems, Para 3.11.4(v)

30.0 Periodical Overhaul of Wagons

30.1 The POH load to the different workshops should be distributed in a manner that one shop handles only one or, at best, two types of wagons. Para 3.12.1

31.0 Pattern of Train Examination

31.1 Railway Board should immediately issue uniform guidelines for freight train examination that should be jointly endorsed by the Mechanical and Traffic Directorates of the Railway Board. Para 3.13.1

31.2 The arrangement of fitting pressure gauges with "Quick Coupling" arrangement in Brake Vans should be implemented within one year. No train should be allowed to operate without this provision. Para 3.14.1

32.0 Closed Circuit Rakes

32.1 The concept of closed circuit rakes should be extended to new circuits Para 3.15.1

32.2 The discipline of logging of the Kms run thereby ensuring

timely examination, is not being maintained. This discipline needs to be enforced. Para 3.15.1

33.0 Block proving with Axle Counters

33.1 In case radio communication is not provided and considering the fact that train partings are still an endemic feature on the Railways, the Committee recommends adoption of block proving with axle counters on a large scale on busy routes. Para 3.17.2

34.0 Level Crossing Gates

34.1 At all non-interlocked manned level crossings on double/multiple lines still having gate leaves, coupled lifting barriers operated from a central location with a suitable locking device should be provided within the next one year. Para 3.18.2

34.2 The working instructions at non-interlocked manned gates having telephone should be modified as per para 3.18.4

34.3 The Railways should identify and upgrade such gates where there is heavy train as well as road traffic through inter-locking. The only complete solution is a road over/under bridge. In view of very large expenditure involved this is only possible if a cess is levied on road users through sale of road vehicles/fuel as was recommended sometime back by Railway Administration. Para 3.18.5

34.4 In the first stage the Railways should install the TAWD at 100 manned gates not provided with telephone within the next one year. Para 3.18.6

34.5 The Railways should immediately take in hand the issue of providing the basic prescribed infrastructure at unmanned level crossings. Para 3.18.7

34.6 Rumble-strips constructed at the approach of manned gates should be removed. Para 3.18.8

34.7 The grade of the gatemen (of Engineering and Traffic) should be raised to that of keyman. Further, the medical category for gatemen should be revised from A3 to B1 to improve availability. Para 3.18.9

35.0 Accident Management

35.1 Railways should set up a Disaster Management Institute that can focus exclusively on training Railwaymen on the various aspects of Disaster Management. Para 3.19.3

35.2 Railways should provide self-propelled medical vans in replacement of the existing medical vans within a span of 5 years. Para 3.19.4

35.3 Every Railway health unit should be provided with a road ambulance and a driver. Para 3.19.5

35.4 Production of 140 tonne cranes should be given high priority and the Railways should aim to provide 140 tonne cranes in all the ARTs within the next five years, if necessary by resorting to imports. Para 3.19.6

35.5 For repair and replacement of parts of equipment in the ARTS, special powers should be delegated to the divisions to procure parts either directly from the original equipment manufacturer or from an approved agency on rate contract upto Rs.1 lakh per quarter. A special imprest of Rs.25,000/- may also

be sanctioned to the officer in-charge of ART for minor repairs of equipment in the relief train. Para 3.19.7

35.6 Two horizontal telescopic boom cranes should be provided on the IR for trials. Para 3.19.8

35.7 In major stations and Railway yards, road vehicles equipped with jacks, hydraulic rerailing equipment etc., should be provided for tackling the minor derailments quickly. Para 3.19.9

36.0 Compensation for Passengers Involved in Train Accidents

36.1 The jurisdiction clause of the RCT Act should be suitably amended so that the applicant can file the case with any RCT Bench. Para 3.20.2

36.2 Even one Member of the Tribunal should be fully authorized to decide claims in accident cases, irrespective of the amount involved. Para 3.20.3

36.3 The Committee endorse the recommendation made by the "Group on Railway Safety" that in case of death, compensation should be paid irrespective of whether the bonafide authority to travel has been produced or not. Para 3.20.4

37.0 Safety Organization

37.1 The Railways must ensure that only officers with an outstanding record of service are posted to the Safety department for a tenure of at least two years. Para 3.21.2(i)

37.2 Each safety officer must be supported by very good calibre officers/inspectors of other departments for a 2-year tenure. 3.21.2(ii) Para

37.3 Each department at Headquarters/division must organize safety as a subject to be dealt with intra-departmentally with safety department working as catalyst. Para 3.21.2(iii)

37.4 All posts of DSOs should be in JA grade so that they can interact with colleagues in the best possible manner. Para 3.21.2(iv)

37.5 Only those officers in the Traffic Department who have worked a minimum of 2 years as DSO will be considered for posting as Chief Operations Manager. Para 3.21.2(v)

38.0 Fire in Trains - Metro Railway

38.1 The definition of fire in Metro Railway's Accident Manual be revised so as to include smoke emission. Para 3.22.2

39.0 Maintenance of Accident Statistics

39.1 Railways should report accidents and compile statistics in strict accordance with the instructions given in the Manual of Statistical Instructions. The tendency to introduce changes in the methods of statistical compilation should be resisted. Para 4.6

39.2 At the earliest, a computerized database of accidents should be maintained by individual Zonal Railways in a universal format, which can be accessed by the Railway Board to update its own data base using the recently installed RAILNET. The format should be designed by the Railway Board. Para 4.8

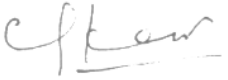
Part - 1 of the report of the Railway Safety Review Committee 1998 is submitted herewith to the Ministry of Railways.



(Justice H. R. Khanna)
(Retd.)
Chairman



(Ananta Sethi, MP)
Member



(C. L. Kaw)
Member



(L.K. Sinha)
Member



(S.M. Vaish)
Member



(V.S. Dutta)
Member



(Dr. Vinod Chandra)
Member



(Mathew John) Secretary
New Delhi
August 1999

APPENDIX - 'A'

Recommendations of Sikri Committee (1978) juxtaposed with remarks furnished by Ministry of Railways regarding implementation.

PART-I

<table>
<tr><th>Item No.</th><th>Recommendation/observation made by Railway Accidents Inquiry Committee</th><th>Action taken</th></tr>
<tr><td>1</td><td>We find that, after a steady fall in the incidence of total accidents to 10.4 per million train kilometres during 1971-72, it sharply rose to 15.2 in 1972-73 and further to 25.0 in 1974 75. This was followed by a decline for two years and then a rise again in 1977-78 when the incidence of total accidents per million train kilometres was 20.9 as compared to 18.7 in the previous year. This does not reveal a healthy trend.</td><td>This is an observation. Incidence of important accidents, failure of railway equipment and miscellaneous accidents per million train kilometres as given in the Annexure I of the report is as under
<table>
<tr><th>Period</th><th>Important Accidents</th><th>Failure of Rly Equpts</th><th>Misc Accidents</th></tr>
<tr><td>63-64 to 67-68</td><td>2.92</td><td>8.04</td><td>3,50</td></tr>
<tr><td>68-69</td><td>1.86</td><td>7.24</td><td>2:44</td></tr>
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<tr><td></td><td></td><td>
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<tr><td>to 72-73</td><td></td><td></td><td></td></tr>
<tr><td>73-74 to77-78</td><td>1.82</td><td>17.40</td><td>2.30</td></tr>
</table>

Thus, the incidence of important train accidents and miscellaneous accidents has been coming down steadily. It is only in respect of failure of railway equipment that increase is apparent. This is because of the fact that for 1972-73 and subsequent years, the statistical norm for reckoning time failure of diesel and electric locomotives as accidents was reduced from 60 minutes to 30 minutes, and cases of failure of overhead wires and signalling apparatus were included the incidence of failure of railway equipments for 1972 73 onwards is, therefore, not strictly comparable with those of previous years</td></tr>
<tr><td>2</td><td>There was, by and large, a fall in the incidence of important accidents per million</td><td>This is an observation (No action was called for)</td></tr>
</table>

	train kilometres except for the years 1974-75 and 1975-76 during which there was an increase. After some Improvement in 1976-77, the incidence of important accidents again increased in 1977 78 both on the broad and metre gauges on the narrow gauge, after an abrupt fall during 1968-69, the incidence of important accidents per million train kilometres steadily rose to 6 10 during 1973-74. This was followed by a decline for three years to 4.10 in 1976-77 In 1977-78 there was a significant increase in the incidence of important accidents to 5.84 per million kilometres.	
3	On the broad gauge, after a sharp drop in the Incidence of train collisions to 0.12 per million kilometres in 1968 69 as compared to 0.16 in the previous year, it fluctuated between 0.12 and 0.15 till 1973-74 when there was a sharp Increase to 0.19. This was followed by a declining trend On the metre gauge also, there has been a general declining	This is an observation.

	trend. On the narrow gauge too, the incidence of train collisions has come down in recent years.	
4	The incidence of collisions involving passenger trains on the broad gauge fluctuated considerably during the last decade. The declining trend from 1968-69 to 1972-73 got reversed during 1973 74 and 1974-75 when the incidence increased to 0.16 per million train kilometres, thus going back to the level obtaining in 1967-68 It then declined for two years to 0.09 in 1976 77 but again rose to 0.15 in 1977-78. In the case of goods trains on the	This is an observation.

	broad gauge, after a general rising trend from 1968-69 to 1973-74, during which period the incidence increased from 011 to 0.22 per million train kilometres, there has been a steady decline in the incidence during the last five years and was 0.08n during 1977-78.	
5	On the metre gauge, the incidence of collisions involving passenger trains registered a sharp decline during 1968-69, being 0.05 per million passenger train kilometres as compared to 0.15 in the previous year. During 1970-71 the incidence rose to 0.07 and has remained almost static thereafter. Collisions of goods train on the metre gauge have shown a general declining trend except for the two intervening years 1974-75 and 1975-76 when their incidence rose sharply.	This is an observation.
6	On the broad gauge, there was a reduction in the incidence of derailment in 1968-69 as compared to the previous year, after which it has remained almost static. Taking passenger	This is an observation.

	and goods trains separately, we find that while the incidence of derailments of passenger trains has not shown much change, there has been considerable decline in the incidence of goods train derailments during the 10-year period of our study as compared to the position obtaining in the 5-year period ending 1967-68	
7	On the metre gauge, the incidence of derailments of passenger trains had recorded a general decline in the quinquennium 1968-69 to 1972 73, but during the subsequent 5 year period ending 1977-78 there was considerable deterioration in the position and the incidence per million passenger train kilometres has gone back to the level obtaining prior to 1967-68 In the case of goods trains on the metre gauge, there was a sharp drop in the incidence of derailments during 1968-69 to 4.91 as compared to 7.7 in the previous year; it has remained around that level since then.	This is an observation.

8	There has been, by and large, a downward trend in the incidence of accidents at both manned and unmanned level crossings during the 10-year period ending 1977-78, Since level crossing accidents account for 45 percent of the fatalities in all accidents, the decline in their number is a healthy sign. During the 5-year period covered by the Wanchoo Committee, the average annual number of persons killed and injured in level crossing accidents was 45 and 169 respectively. As against that, during the 10-year period ending 1977-78, the average annual number of persons killed, injured had gone up to 93 and 229 respectively. This clearly shows that the fall in the incidence of level crossing accidents does not mean a reduction in the hazard to human life and limb in these accidents. Since just less than half of total deaths in railway accidents are accounted for by level crossing accidents, the gravity of these needs no further emphasis.	This is an observation.

9	There was a sudden drop in the incidence of fires in trains on both the broad and metre gauges during 1970-71 as compared to the previous year. This was due to the revision in classification of accidents falling in this category consequent to implementation of recommendation 324(i) in Part 11 of the report of the Wanchoo Committee, whereby fires in diesel and electric locomotives began to be treated as 'engine failures. Thereafter the incidence of fires in trains on the broad gauge had increased However, since 1974-75 there has been a declining trend. On the metre gauge, the incidence of fires increased during 1975-76 followed by a decline during the next two years.	This is an observation.
10	Engine failures had recorded a sharp increase in 1972-73 and the figures had more than doubled by 1975-76. The increase during 1972-73 was due to the revised classification of engine failures according to which a diesel or electric locomotive is considered to have	Locomotive failures are directly linked with engine Kms. earned and inasfar as diesel and steam locomotives are concerned, a comparison of Engine Kms. per engine failure indicates the following trend: - **Year** | **Lakh**

failed if it causes a delay of 30 minutes or more to the train it is hauling (as against the earlier figure of 60 minutes or more). After a sharp drop in engine failures during 1976-77, their number again increased in 1977-78.

	Kms/failure
1972-73	1.16
1973-74	0.74
1974-75	0.56
1975-76	0.69
1976-77	1.09
1977-78	0.904

The performance was affected during 1974 due to disturbed labour conditions when locomotives had to be operated with limited attention skipping the
stipulated maintenance schedules and these areas were later cleared gradually with corresponding improvement in performance in successive je Slight drop in 1977 78 as compared to 1976-77 largely due to the normal variation from year to year

		Reliability of Diesel Locomotives has also be affected due to adequate homing, capacity in not being available on account of limited availability of funds. Action is being taken to gradually liquidate these arrears. However, this can only be overcame by the availability of more funds in the railway plans for which efforts are made with the Planning Commission Gradual indigenisation of spares for maintenance of Diesel Locomotives, which is essential and advantageous on long term basis, has also contributed to reduced reliability of performance and this is inevitable in the transition phase it is however ensured that critical items which impinge upon safety of operation, are not indigenised what due tests and trials.
11	The declining trend in the number of failures	The number of failures have to be related to

	of couplings and draft gear which had set in prior to the appointment of the Wanchoo Committee, continued till 1973-74 after which there has been an upward trend. In 1976 77, the number of such failures rose sharply to 621 as compared to 382 in the previous year Though their number dropped to 526 in 1977-78, it is still quite high as compared to the position prevailing prior to 1976-77.	the traffic moved The Committee itself has noted that incidence of train partings per 100 million vehicle kilometres has dropped both on Passenger and Goods trans
12	Failures of other rolling stock such as failures of tyres, axles, wheels, brake apparatus etc. which had been steadily declining till 1973-74 had doubled during 1974-75. This was followed by a decline in such failures during 1975-76 and 1976-77 However, during 1977-78, there was an abnormal increase in their number from 300 (in the previous year) to 1267 This sudden increase is disquieting and calls for investigation and action,	Instruction issued vide Board's letter No.51 M(MSP)/7/24 dated 11584 that in future, to maintenance and reporting of figures of Mech Failures, instruction contained in the statistical Manual should be strictly adhered to.
13	From the breakup of 1267 failures of other rolling stock during 1977-78, we find that the	Same as indicated against item 12 above.

	Central and South Eastern Railways accounted for 620 and 615 staff failures respectively, le 975 per cent of the total While surprisingly no such failure was reported on the North Eastern, Northeast Frontier and Southern Railways, only 2 such failures were reported on the Northern, 9 on the Western, 10 on the Eastern and 11 on the South Central Railway It appears that the figures reported by most of the Railways may not be correct and the reporting of such failures and compilation of statistics in this regard need to be thoroughly locked into	
14	There was a sharp rise in the number of failures of permanent way during 1972-73 This was followed by a further jump in 1976 77, the rise being mainly due to increase in the number of broken rails. The incidence of broken rails per 100 kilometres of running track increased from 0.14 during 1968-69 to 1.22 during 1976-77. During 1977-78, the incidence stood at 0.91. The steep increase in	The tempo of track renewal has been substantially increased from 1096 in 80-81 to about 2260 Km. in - 83-84. The target for 84-85 has been kept as 2500 Km. The gross outlay for track renewals has also been increased from Rs. 124 crores in 80-81 to Rs 350 crores in the current year Provision has been made in 7 Plan for wiping off the arrears of renewals in the next 10 years as

	the incidence during the last decade is a matter of concern and calls for corrective action.	also recommended by the RRC (keeping in view its continuous nature the recommendation was treated as implemented).
15	Failures of overhead wires has shown a general decline since 1973-74.	This is an observation
16	Compilation of separate statistics of failures of signalling apparatus commenced only from 1975-76. No trend is discernible during this short period except that during 1977-78, there has been an increase in such failures as compared to the previous two years.	Noted. However, this had been classified as observation.
17	The declining trend in the incidence of miscellaneous accidents, viz. Trains running over obstructions, collisions involving light engines, trollies, derailment of light engines, fires at stations, etc. which had commenced prior to the appointment of the Wanchoo Committee continued till 1971-72. This was followed by an increase in the incidence of such accidents during 1972-73 & 1973-74	

	after which there has again been steady decline.	
18	There has been a general declining trend in the incidence of averted collisions, breach of block rules and disregard of signals by drivers.	This is an observation.
19	The incidence of passenger train partings per 100 million vehicle kilometres has dropped considerably during the last 10 years. During 1977-78, the incidence was 0.19 as compared to 1.36 during 1968-69. There has been a fall in the incidence of train partings on goods trains also, though not as marked as in the case of passenger trains. The incidence of goods trains parting for 100 million wagon kilometres has dropped from 5.45 in 1968-69 to 3.22 in 1973-74. The incidence had gone up for 2 years during 1975-76 and 1976-77; however, during 1977-78 it dropped to 3.88 as compared to 4.62 in the previous year.	This is an observation.

20	There has been a general decline in the incidence of important accidents, miscellaneous accidents and indicative accidents during the 10-year period from 1968-49 to 1977-78 as compared to the position obtaining in the 5 year period from 1963-64 to 1967-68 which was reviewed by the Wanchoo Committee	This is an observation.
21	Failures of railway equipment, namely, locomotives, rolling stock, permanent way etc, however, Increased substantially during the period 1968-69 to 1977-78. This demands immediate attention and action.	Instructions had been issued to Zonal Railways vide Mech. Dte's letter No.86-M(L) 165/5 dated 10.12 1966
22	We find that the years 1974-75 and 1975-76 stand out as two significantly bad years as far as accidents are concerned. During these years, the incidence of almost all categories of accidents increased sharply. This increase has been attributed by the Railway Board mainly to the general labour unrest which culminated in the all India railway strike in May 1974 and its after effects This clearly brings out the importance of healthy industrial relations on	This is an observation

<table>
<tr><td></td><td>the Railways for safe and efficient operation of trains.</td><td></td></tr>
<tr><td>23</td><td>During the 10-year period from 1968-69 to 1977-78 there were 219 serious accidents on the Indian Railways Out of these, in 218, statutory enquiries were held by the officers of the Commission of Railway Safety and in one case enquiry was held by a Commission of Inquiry appointed under the Commission of Inquiry Act, 1952.</td><td>This is an observation</td></tr>
<tr><td>24</td><td>While serious accidents constituted only 2.3 per cent. of the total number of important accidents, these accounted for 49.1 per cent of the injuries and 20.7 per cent of the loss due to damage to Railway property in all categories of important accidents.</td><td>This is an observation</td></tr>
<tr><td>25</td><td>During the period from 1973-74 to 1977-78, there were 114 serious accidents as compared to 74, 79 and 85 serious accidents during the earlier three five-year-periods commencing from 1957-62 There was thus an increase in the number of serious accidents during the last 5- year period ending 1977-78. During the</td><td>Items No. 25 and 26:

These are observations. There has been appreciable increase in passenger kilometres over the years as indicated below:-
<table><tr><th>Period</th><th>No. of</th><th>Passenger</th></tr></table></td></tr>
</table>

	same period, the incidence of serious accidents per million train kilometres increased to 0.048 from 0.036 in the previous two 5-year periods.	
26	We find that the incidence of serious accidents which fall in the categories of important accidents, when taken as a proportion of the total number of important accidents, has been continuously rising even though the number of important accidents has	

	Serious Accidents	**Kilometres (in millions)**
1963-64 to 1967-68	79	487.679
1968-69 to 1972-73	85	697.298
1973-74 to 1977-78	144	751.219

Thus, compared to the period 1963-64 19676 passenger kilometres had increased by more than 54 percent during the period 1973-74 to 1977-78. The number of serious accidents during these respective periods was however 79 and 114 respectively indicating an increase of only 44.3%

The Committee have observed in para 54 of the report tut they will advert to the matter regarding consequences of important accidents becoming more serious, in their subsequent report.

	been falling. This, prima facie, indicates that the consequences of important accidents are becoming more serious.	
27	The number of serious accidents due to failure of drivers registered an increase of 50 percent during the period 1968-69 to 1972-73 and 1973 74 to 1977-78 over those in the earlier two 5-year periods.	Item No.27 and 28: Same remarks as against Item No.25 and 26
28	Serious accidents due to failure of station staff, which decreased considerably during the period 1968-69 to 1972-73, again went up during the period 1973 74 to 1977-78 to the level obtaining prior to 1968-69.	
29	There was a decrease in the incidence of serious accidents attributable to train wrecking during the period 1973 74 to 1977-78 as compared to the earlier 5-year period	This is an observation.
30	Accidents at level crossings due to failure of road users increased sharply during the period 1973-74 to 1977-78 as compared to the	This is an observation Detailed comments given against items 25 & 26 hold good in this case also in addition it may be

	position obtaining in the earlier three 5-year periods of our review.	mentioned that the number of Motor Vehicles in India have also risen sharply as indicated below:

Year	**Total number of motor vehicles (taxed and tax exempted Excluding two wheelers)**
1951	279,453
1952	384,599
1961	576,115
1966	873,412
1971	1,289,422
1976	1,633,871
1977	1,846,307

This may also be one of factors for increase in the number of accidents at level crossings

		due to the failure of road users.
31	The incidence of serious accidents due to failure of locomotives went up during the period 1973-74 to 1977-78	Serious accidents due to engine failure have come down to 'Nil" in 1979-80 and in 1980-81. In view of this and the Govt views, the recommendation was treated as implemented.
32	The incidence of serious accidents due to failure of rolling stock has been continuously rising since the period 1963-64 to 1967-68. This is a disturbing trend and calls for urgent corrective action.	The incidence of serious accidents attributable to Rolling stock defects was high in the years 1973-74 and 1974-75. Since then, there has been a marked improvement.
33	The incidence of serious accidents due to failure of track has also increased in recent years. From 3 serious accidents during the 5-year period 1963-64 to 1967-68 their number	The total number of derailments during the five-year periods 1963-64 to 1967-68, 1968-69 to 1972-73 and 1973-74 to 1977-78 and

had increased to 5 and 8 during the next two 5-year periods

those caused due to track defence have been as under:

Year	Total No of Derailments	Derailments caused due to track defects.	% age
1963-64 to 1967-68	5087	333	6.5
1968-69 to 1972-73	3348	84	2.5
1973-74 to 1977-78	3380	84	2.48

It will be seen that derailments due to track defects as a percentage of the total

derailments have reduced during the past 15 years. Moreover, the track utilisation has also increased during this period as will be seen from the figures of train kms. During these periods given below:

	Periods	**Train Kms (Millions)**
I	1963-64 to 1967-68	2090
ii	1968-69 to 1972-73	2265
iii	1973-74 to 1977-78	2328

On important routes track structure is being strengthened on a programmed basis by laying heavier section and welded rails wooden/ST/concrete sleepers using on elastic fastenings Improved methods of track maintenance such as measured shovel packing', 'directed track maintenance' and

		'mechanical maintenance of track are being introduced on increasing lengths of track monitoring methods have also been improved by using USFDS and track recording cars.
34	There was a substantial increase in the incidence of serious accidents due to fires in trains during the last 10 years. From 3 serious accidents during the period 1963-64 to 1967-68, their number shot up to 10 during the period 1968-69 to 1972-73 and to 12 during the period 1973-74 to 1977-78.	This is an observation.
35	Miscellaneous causes, namely, faulty securing of consignments, failure of catanary, moving train hit by objects on the platform and other causes accounted for 14 and 12 serious accidents during the two 5-year periods 1968-69 to 1972-73 and 1973-74 to 1977-78 respectively as compared to 12 during the 5 year period 1963-64 to 1967-68 and 7 during the period 1957-1962	This is an observation.

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<tr><td></td><td></td><td></td></tr>
<tr><td>36</td><td>Failure of Railway staff or human element was responsible for the largest number of serious accidents. The proportion of accidents attributable to human element has remained almost static around 43 per cent during the last three 5-year periods. Failure of equipment Le Locomotives, rolling stock and track takes the next place after failure of Railway Staff and the proportion of serious accidents due to these causes has steadily increased from 7.6 to 18.4 per cent during the last three 5-year periods of our review.</td><td>This is an observation. The comments against relevant items have been offered recommendations indicated below:
<table>
<tr><td>1</td><td>Failure of human elements</td><td>Item 27 and 28</td></tr>
<tr><td>2</td><td>Failure of locomotives & Rolling Stock</td><td>Item 31 and 32</td></tr>
<tr><td>3</td><td>Failure of Track</td><td>Item 33</td></tr>
</table></td></tr>
<tr><td>37</td><td>Although the recommendations of the Wanchoo Committee referred to in para 63(1) and (ii) of this report were accepted in principle, it has not been possible for the Railways to implement them The recommendation in para 63 (ii) was not accepted by the Ministry of Railways.</td><td>On this the Ministry of Railways cannot act in isolation. A comprehensive Industrial Relation Bill is already before the Parliament (Classified as not accepted)</td></tr>
<tr><td>38</td><td>White machinery exists on most of the</td><td>Instructions issued on S.C. Railway vide</td></tr>
</table>

	Railways to promptly redress grievances staff, the welfare organisation on the South-Central Railway is inadequately staffed. In huge organisation like the Railway employing about 15 lakh regular employees and 3 lakh casual labour, grievances are bound to exist, especially having regard to the complicated rules and procedures. While the observance of staff welfare weeks/fort-rights serves limited objectives and renders limited help, there is need for gearing up the machinery to ensure that staff representations are expeditiously attended to at all times.	Board's of letter No. E(W)79WE1-20 dated 30.9.80 to streamline their welfare organisation so as to strengthen it to a adequate level without the creation of any additional post
39	We find that some Railways are giving training to welfare inspectors while some are not. Personnel management is a specialised subject and welfare inspectors should be fully equipped for the same. We recommend that persons who are to work as welfare inspectors should be given proper training either before or within a specified period of talking up duties as welfare inspectors so that they have	Instructions had been issued under Board's letter No. E(W)79WE1-20 dated 18-12-1979.

	an idea of the background in which they have to function.	
40	The time taken by the Railways for finalising of accident cases exceeded in all cases the target laid down by the Railway Board. In respect of cases where minor or major penalties were imposed and also where major penalty charge sheets were issued but minor penalties were imposed, the average time taken exceeded the target by a very wide margin. Thus, the recommendation made by the Wanchoo Committee remains substantially unimplemented. We would urge the Railway Board to take steps to ensure that the causes of delay in finalising accident cases are identified and remedial measures taken to achieve the target laid down by themselves.	Since appropriate and continuous attention was being paid on the subject at all levels, the recommendation was treated as implemented.
41	In respect of the Wanchoo Committee's The instructions had been rated wide Body recommendation that senior supervisors should letter No. E(NG)I-81-PMI-246 dated 12.81 always be consulted in regard to	The instructions had been reiterated vide Board's letter No. I(NG)I-81-PMI-246 dated 8.12.81

	promotions and transfers of staff in their charge, we find that the Railways have expressed opinions, which are divergent from the views of the Railway Board. This recommendation of the Wanchoo Committee does not appear to have been fully implemented.	
42	In respect of the recommendation in para 79) of this report, we consider that it would be difficult to evolve scales of pay which do not overlap at all In any case, such a position does not ordinarily obtain in any department of the Govt. or any public sector undertaking We, however, note that, to the extent the idea behind this recommendation could be accepted, action has already been taken within the framework of the recommendations of the Third Central Pay Commission.	This is an observation.
43	Regarding the Wanchoo Committee's recommendations in para 79() of this report in respect of upgradation of certain supervisory	This is an observation.

	posts, we feel that this has been substantially implemented to the extent it was accepted by the Railway Board	
44	As the figures of 1976-77 show, there is no improvement in the officer-staff ratio, and the position in this regard in the major departments concerned with safety of rail travel, namely, Transportation, Civil, Mech, Electrical and Signal and Telecommunication Engineering, has in fact deteriorated as compared to the position obtaining in 1962-63. However, keeping in view its continuous nature, the Wanchoo Committee's recommendation, recommendation was treated as implemented therefore, remains unimplemented. We would urge the Railway Board to take urgent action to bring about an improvement in the officer- staff ratio.	In addition to 530 posts which have already been upgraded from Group 'C' to Group 'B' (Class II) in 1978, the Government have also approved upgradation of another 600 class III (Grade C) posts to class II (Grade 'B'). This will further improve the officers-staff ratio. However, keeping in view its continuous nature, the recommendation was treated as implemented.
45	We feel that it is necessary to have a clear definition of the term 'supervisors before determining the ratio of supervisors to staff.	This was also treated as implemented, but its relevant file is not traceable.

	Having clearly identified supervisory staff it would be necessary to take immediate steps to arrive at a rational supervisor-staff ratio and we recommended accordingly.	
46	It has taken almost 8 years for the Railways to finalise the stages at which in-service psycho-technical tests are to be administered in the case of some operating categories. No decision appears to have been taken so far for the application of psycho-technical tests at the time of conversion training of staff from steam to either diesel or electric traction. We would urge the Railway Board that the decisions now taken for in-service application of psycho technical tests to certain categories of staff should be implemented without further delay It is also necessary that the stages for in- service psycho technical testing in the case of remaining categories of staff directly connected. with the safe running of trains, are also prescribed at the earliest.	Noted. Extension of in-service psychological testing to other categories of staff is a sensitive issue on which the administration has necessarily to move gradually as it is essential to remove misgivings which the staff will have about these tests. However, a beginning is being made in regard to the in-service application of psycho- technical tests at the stage of selection of Engine Cleaners and Pointsmen Grade 11 / Levermen Grade 11, w.e.f. February 1980. Further, periodic psycho technical check-up of Mail/Express drivers above 45 years had been introduced.
47	We find that, even though the Railway Board had agreed in principle to widen the scope of	The Psycho-Technical Cell had conducted studies & research on the phenomenon of

	activities of the Psycho-technical Cell, not much progress has been made in this direction due to inadequacy of staff. Thus, the Wanchoo Committee's recommendation for extending the scope of labour science research on the Indian Railways remains substantially unimplemented.	fatigue on drivers, ageing factor affecting performance, desired training module for diesel conversion training of drivers.
48	In the light of the views of the Ministry of Home Affairs the Railway Board did not consider it advisable to proceed with the proposed legislation of debarring prosecution of railway staff without sanction of the competent railway authority. In some States, there are rules, which provide for sanction to be obtained at an appreciably higher level in the police hierarchy before prosecution is launched. This was meant to avoid capricious prosecution of staff. Having regard to the views expressed by the Ministry of Home Affairs and the State Government, we feel that there is no necessity to peruse this recommendation further.	This is an observation.

49	We find that though the recommendation of the Wanchoo Committee for setting up centres of training for electrical signal maintainers has been substantially implemented, there are deficiencies in the facilities for training in schools/centres on some Railways, especially in respect of models of sophisticated signalling 86 equipment. We would urge the Railway Board to ensure that the Railway Administrations provide these facilities in schools for training of signal maintainers as early as possible.	Proposals for creating adequate training facilities on all Railways except N and NE. had been approved and works were underway. Position of NR. was OK NE had also proposed the work of augmentation of training facilities in the S&T training school at Gorakhpur at a cost of Rs. 19:64 lakhs in FWP-1985-86.
50	The Wanchoo Committee's recommendation referred to in para 117 of this report regarding recruitment training and grades of signalling staff, has been substantially implemented. The Railway Board should take steps to see that their directives in this regard is implemented on the North-Eastern Railway as well.	Instructions contained in Board's letter No E(NG)!! 80/PRI 39 dated 31.181 were being complied with by N.E. Railway.

51	Training facilities for panel operators are still to be developed on some of the Railways. This recommendation has, therefore, been only partially implemented. We would urge the Railway Administrations to create the necessary facilities for training of panel operators without further delay.	With the exception of S.E. Railway, ai Railways had made arrangements for training staff either through simulator in the model room or by practical demonstration in the field SE Railway had also been advised that practical demonstration of panel working should be organised and competency certificate issued.
52	We find that though the planning for setting up a centralised training school for electric supervisory staff commenced in 1971-72, not much progress has been made in the construction of the school building; only part of the hostel accommodation has been completed and laboratory equipment, models etc., have still to be procured. Thus the progress of setting up of this school has been extremely poor. We feel that proper training of electric supervisory staff cannot be ensured in the absence of a centralised training school with necessary laboratory equipment, models etc. Thus, imparting of basic training to electric supervisory staff, envisaged by the	The school building had been fully completed and had been occupied w.e.f. 1.1.1983. In fact classes were started from Dec, 27 and 282 courses had since been conducted Basic facilities including facilities of electronic instruments and other training needs had been fully provided.

	Wanchoo Committee, remains unfulfilled. The matter will not brook any further delay and we would urge the Railway Board to ensure the provision of a properly equipped centralised training school with a sense of urgency.	
53	The Wanchoo Committee's recommendation for setting up schools for training artisan staff employed in the maintenance of General Electric and train lighting services has been substantially implemented. The Eastern and Southern Railways should take urgent steps to set up their own training centres for artisan staff for electric traction.	Both the Railways Le. Eastern and Southern were very much aware of the recommendation and they had/were taking necessary action in the matter Whereas the Eastern Railway was not in favour of establishing centralised facility of training on their Railway, the Western Railway had set up a centralised training school at Avadi.
54	We find that there is no uniformity in the minimum educational qualifications prescribed for selecting staff from the steam side for conversion training in diesel and electric traction. The staff who are being given conversion training range from illiterates to matriculates. Thus, the recommendation that staff should have	Instructions regarding mode of filling up the posts of Ist Firemen Diesel Asstt./Electic Asstt. Etc. had been issued by the Estt. Dee. Vide their letter No. E(NG)1/84/PM 7/56 dated 3.11.87.

	adequate education and technical background remains unimplemented on most Railways. We agree that the staff utilised for operating diesel and electric locomotives should possess the necessary skill and aptitude and a minimum level of education for acquiring job proficiency of a reasonable standard.	
55	Facilities for conversion training of driving staff from steam side to diesel /electric side have been by and large developed on all the Railways.	Noted
56	The Railway Board had not accepted the recommendation regarding simulation training of drivers. The Railways have also not adopted simulation training in its accepted concept, though some form of rudimentary simulation training is in vogue on some of the Railways.	This is an observation. It may also be noted vide para 140 that the Committee proposes to go further into this in their subsequent report.
57	We are constrained to note that no progress has been made in the setting up of a centralised training centre for training of staff	The work of setting up of centralised training school and Hostel for the training of staff of the track Machines was in progress

	for mechanised inspection and maintenance of track, even after a lapse of 10 years, and this recommendation of the Wanchoo Committee remains unimplemented. We would urge the Railway Board to take expeditious steps for the setting up of such a centralised training school at the earliest.	at Allahabad and was likely to be completed during 1983-84
58	There has been a steady fall in the percentage of steam engine failures due Frontier, South Eastern and Western Railways and metre gauge on the Central Railway, there was an increase in engine failures due to mismanagement by engine crew during 1977-78 as compared to the previous year. These Railway Administrations should take effective steps to reverse this trend.	Instructions issued to zonal Railways vide Mech to Directorate's reference 86 M(L)/165/5 dated mismanagement by engine crew on the broad 10.12.86 in which Railways had been requested that and metre gauges. From the performance of instructions already communicated under Board's Individual Railways, however, we find that in letter of even number dated 12.8.86 should be the case of broad gauge on the Northeast strictly followed.
59	We find that the available training capacity is grossly underutilised. This recommendation, therefore, remains unimplemented. We feel that the factors, which militate against full	Many steps had been biker proposed to be taken by the establishment Directorate to improve the situation. This was a continuing process. The subject of Non-Gazetted staff

	utilisation of the training capacity have been known for a very long time, but remedial action is still wanting Viewed against the background of heavy arrears of refresher training to be overtaken, the present position is totally indefensible The Railway Board should take effective steps in this direction and ensure full utilisation of the training capacity	had been entrusted to an And Director for monitoring in Board's office.
60	The Railways have attributed the backlog in refresher training to inadequacy of trainee reserve posts, failure to nominate staff for training, failure to make relief arrangements in time, nominated staff reporting sick etc We cannot understand why the Railways are still feeling the shortage of trainee reserve posts when the Railway Board have categorically informed us that this need has already been adequately provided for All these factors are well within the control of the Railways and should not have been put forward as an alibi	Action taken with regard to the implementation of recommendation No. 59 above is fully applicable to this recommendation also except the one point of creation of training reserve posts. Regarding this though the instructions already exist, on account of the ban order the Railways were unable to create more posts of training reserve This problem was hoped to be solved automatically when the ben a lifted.
61	We find that no clear definition of who should	Closed in the light of fresh recommendation

	be treated as essential staff for the purpose of allotment of houses has so far been laid down by the Railway Board and uniformity in the criteria for so classifying the staff is still missing	made in part II of the report as item Nos. 56(1) to (iii).
62	It will be seen that the annual rate of construction of staff quarters has been falling continuously since 1965-66 As a result of this, the percentage of staff housed, which had increased to 37.81 in 1968-69 as compared to 34.81 in 1955-66, has marginally declined in recent years and stood at 37.14 in 1977- 78. We feel that Parliament having approved charging of the cost of construction of staff quarters to Capital and to dividend being payable only on such Capital if the Railways have surplus after discharging all other liabilities, there should have been an increase in the number of staff quarters constructed. We hope that necessary steps in this direction will now be taken by the Railway Board.	All possible efforts would continue to be made to provide housing to the maximum number of railway staff within the funds available. The Railways planned for construction of quarters as per the allotment made by the Board every year under the plan head 'Staff' Qrs.
63	We find that the Wanchoo Committee's	Necessary action had been taken.

	recommendation regarding proper job analysis of the work of signal maintainers and their rostering in 8/12-hour shifts, as may be necessary, has not been implemented on all the railways. A permanent solution to the problem of attending to failures during night has also not been possible on some Railways. We would urge the Railway Administration to look into this for early implementation.	
64	We are happy to note that in the case of hours of running duty of drivers grade 'A' and 'B' working mail, express and passenger trains, there has been a marked improvement and there were only stray cases of running duty exceeding 10 hours on a few railways. The incidence of running duty of more than 10 hours at a stretch in the case of drivers grade C working goods trains is high and ranges between 14.0 per cent on the Southern Railway to 34.0 per cent on the N.E. Railway. In comparison to the position obtaining in	Since this is a continuous process and constant monitoring was being done at alt levels, the recommendation was treated as implemented.

	1967-68, the incidence of trips with running duty exceeding 12 hours at a stretch has gone up on the Central and N.E. Railways. The incidence of trips with more than 14 hours running duty when taken as a percentage of the total number of trips by goods train drivers were 8.8, 3.1, 7.8, 1.5, 5.8 and 1.9 on the Central, Eastern, N.E. Southern, S.C. and Western Railways respectively. Trips of more than 20 hours running duty at a stretch accounted for 1.0, 1.1 and 0.9 per cent of the total number of trips on the Central, N.E. and SC Railways. We find that the recommendation made by the Wanchoo Committee and accepted by Railway Board still remains to be implemented in the case of drivers' grade C working goods trains on all the railways. It is unfortunate that in a matter which has such direct bearing on safety, the action taken so far has been tardy.	
65	We feel constrained to say that much remains to be done in the matter of upkeep of running	Necessary instructions had been issued to zonal Railways by Coaching Directorate.

	rooms. In view of the introduction of new trains, changes in the pattern of train services and general improvement in the standard of living of the people, we feel that the assessment of accommodation amenities and facilities to be provided in and maintenance of running rooms has to be a continuing process so that running staff directly connected with safety of train operations should have adequate rest in modestly furnished, clean and sanitary rooms.	
66	Shortage of staff in the categories of station masters, assistant station masters, switchmen and Cabinmen had increased on all the Railways in 1977-78 as compared to the position in 1967-68. In the case of most other safety categories of staff also, shortages have increased on a majority of the Railways. We are unable to accept the claim made by the Railway Board that the position in respect of shortages of staff has improved to a great extent. Thus the recommendation of the Wanchoo Committee remains unimplemented	Instructions were issued under Board's letter t E(NG)11/76RC 1/16 dt. 15.12.80

	for most categories of staff on the Railways The need to wipe out the shortages cannot be over-emphasised and we would urge the Railway Board to take effective measures in this regard.	
67	From the information furnished by the Central and Western Railways, we find that the incidence of overtime working persists to a significant extent even in the case of safety categories to staff The Railway Board should take effective steps to bring down overtime working to the minimum in the case of categories of staff connected with safety of train operations	Overtime figures were being continuously scrutinised thy setting up of monitoring cells on Central and Western Railways
68	The present level of leave reserves which the Railways have been permitted to operate in various categories has been found inadequate and this recommendation of the Wanchoo Committee remains unimplemented.	Keeping in view the fresh recommendation made vide recommendation No. 57 in part-II of the report, the contents of which are similar, this item was treated as closed.
69	There has so far been no reduction in the time taken for finalising the recruitment to different categories of staff, on the contrary,	Since the contents of this recommendation were covered by recommendation No. 21. In Part II, nis item was treated as closed.

	the time actually taken in some cases has been much in excess of the target.	
70	We find that guidelines for the jurisdiction of permanent way Inspectors were issued before the introduction of high-speed trains on the Indian Railways. The last decade has seen considerable changes in track structure, methods of track maintenance and inspection in view of these developments, it would be necessary to review the jurisdiction of permanent way Inspectors.	This had been closed in view of the similar recommendation No. 61 made by the Committee in part-II of their report.
71	We feel that having laid down a yardstick for determining the strength of signal and telecommunication Inspectors, the Railway Board must take urgent steps to implement it within the shortest possible time.	Instructions were issued vide letter No. 76/EB/1700 dated 6.3.78 and also keeping in view its continuous nature the item had been treated as implemented.
72	It is necessary that the guidelines laid down for the strength of carriage and wagon inspectors are implemented without insisting on matching surrenders.	The recommendation has been implemented to the extent that 129 posts of C&W Inspectors have been created without matching surrender. Further augmentation is not possible now because of the restrictions

		on creation of posts and will be considered when the financial position improves.
73	The Railway Board felt that it was not opportune to issue a uniform yardstick for determining the strength of loco inspectors due to wide variation from railway to railway. We do not consider this as sufficient reason for not laying down a yardstick for loco inspectors.	Necessary instructions issued under Board's letter No.82/M(L)/467/2 dated 26.9.1991
74	The recommendation of the Wanchoo Committee for providing 60 kg/m rails on section were the density of traffic may not have reached 20 gross million tonnes but may be rapidly increasing, had not been accepted by the Railway Board. Some of the Railways have informed us that even though minimum track standards for trunk routes and main lines have been laid down, there are sections carrying a large number of high-speed trains where the track structure remains below the stipulated standard. It is necessary that the track structure is brought up to the stipulated standard at the earliest	Indigenous manufacture of 60 kg Rails was started only during 1978. In addition, 20,000 tonnes of 60 kg. Rails are being imported from Germany. The laying of 60 Kg. Rails on high traffic density routes will be done on a programmed basis. Closed in view of a similar recommendation made in part II vide item No. 69

75	We are happy to note that considerable progress in the laying of long/continuous welded rails has been made on the Central and Northern Railways. On the Southern and South Central Railways, the progress in this respect has not been commensurate with their track kilometreage and would need to be accelerated. The South Eastern, North Eastern and Northeast Frontier Railways have a relatively larger proportion of fish-plated track and we would urge these railways to take effective steps for the welding of rails expeditiously.	Laying of CWR/LWR was being enforced along with primary track renewals to the extent feasible. The priority for laying LWR/CWR had been given to categories A, B and C routes on B.G. The yearly laying of CWR/LWR on all Railways was at that time comparable except for N.E. and N.F. Railways where important routes were very few. The progress was being monitored. Over 11,000 kms of track had been laid with LWR/CWR when the position was received in November 1984,
76	Railways requirement of wooden sleepers during the 5-year period ending 1977-78 was met to the extent of only 41 and 50 per cent on the broad and metre gauges respectively. It is quite clear that the supply position of wooden sleepers has not at all been satisfactory. The forecast for their supply in the future also does not appear to be encouraging due to dwindling forest resources. Having regard to these	The Committee's observation is noted. Action is already under way to increase the production of PSC sleepers in the country so as to offset the shortage of wooden sleepers and also to meet the requirement of track standards for high speed and high traffic density routes. The PSC sleepers can also be used in track circuited areas. It has already been decided to use axle counters to the maximum extent for the purpose of track

	considerations, the Railways will have to rely more and more on other types of sleepers and alternative means like axle counters for track circuiting etc.	circuiting so as to keep down the requirement of wooden sleepers.
77	We are constrained to note that the average annual progress of laying concrete sleepers during the period 73-78 had been only 52 kms, which was 5 percent of the length of primary sleeper renewals done on the Railways during the said period. The supply of concrete sleepers has not built up during the last decade as was envisaged by the Wanchoo Committee and their recommendation in this regard, therefore, remains substantially unimplemented.	Laying of concrete simpers is a continuous process Length of concrete semper track up to 31.18 reached to 650 kms. Tenders for setting of additional Factories were under consideration when the recommendation wastes a implemented.
78	The Wanchoo Committee had envisaged the use of concrete sleepers as an alternative to wooden sleepers for track circuiting. There has, however, been very little progress in the use of concrete sleepers in track circuiting We note that due to unsatisfactory electrical resistance of the present designs of concrete	Laying of concrete sleepers in a track circuited length was also of continuous nature Concrete sleepers were being land in track creating length on nominated routes. Concrete sleepers with sufficient electrical resistance to suit track lengths have been

	sleepers, their use in track circuiting works has been permitted with reservations. Having regard to the fact that the Ministry of Railways are committed to the provision of track circuiting on a programmed basis and noting that not enough wooden sleepers would be available, we feel that unless greater efforts are made in regard to the procurement of concrete sleepers, it is unlikely that any significant progress can be made in future. For this purpose, it is also necessary to develop concrete sleepers which can be used for track circuiting without any restrictions reservations or reservations.	designed and are being manufactured. These are planned to be lead in track circuited lengths on those routes which are programmed for renewal with concrete sleepers.
79	We find that recommendation of the Wanchoo Committee for providing guard-rail and walkways on girder bridges has not been fully implemented on all the Railways. We hope that the Railway board will ensure that at girder bridges, on at the Railway, we provided with guard-rat and walkways without exception, within a short period.	All Railways had provided guard-rails and walkways on girder bridges

80	We find that deficiencies still remain in the maintenance and equipment of level crossings and in the training of Gatemen in safety procedures. In view of the heavy toll of life and limb that accidents at level crossings take their proper maintenance and training of Gatemen in the protection of rail and road traffic cannot be over-emphasised RS important, therefore, that the Railway Administrations give higher priority to remedying this situation.	Necessary instructions had been issued to Zonal Railways vide Board's letter to 71/W-1/C/S 04.06.1982 to ensure effective steps.
81	With reference to Wanchoo Committee recommendation referred to in para-242 of this report, nothing appears to have been stipulated regarding the periodicity at which the ballast diagram should be revised. In effect, this recommendation of the Wanchoo Committee does not seem to have been accepted by the Railway Board and the earlier practice on the Railways continues.	This is an observation.
82	We are in agreement with the Railway Board that no specific percentage of clean ballast for	This is an observation.

	undertaking complete re-ballasting needs to be laid down. Maintenance recoupment of ballast is a continuing process for the proper upkeep of track and such recoupment should be done on the basis of actual requirement.	
83	During the 5-year period ending 1977-78, the total quantity of ballast procured by all Railways averaged 2.68 million cubic metres per annum Some portion of the total quantity of ballast so procured must have been used on works of track renewals and increasing ballast cushion. Therefore, there is no doubt that the quantity of ballast used for recoupment has considerably fallen short of the Railway Board's own assessment of 2.8 million cubic metres per annum We find that some Railways have shortfall while others have none It is surprising that the information given by the Railways does not corroborate the conclusions of the Railway Board that adequate quantity of ballast is being procured for recoupment. We also do not consider as adequate the reasons given by some of the	Position was considered to be satisfactory in 1987-88 as compared to the performance of 1980-81. However, in view of its continuous nature, the recommendation was treated as implemented.

	Railways for not carrying out an important work on which depends the effectiveness of track maintenance and health of the track. This recommendation of the Wanchoo Committee, therefore, has not been fully implemented. The Railway Board should take urgent steps to see that the procurement of ballast is increased to meet fully the requirements for normal recoupment.	
84	The Wanchoo Committee had expressed the hope that the Railways will step up the pace of track renewal and bring down the backlog. Not only has this hope been belied, but the position has deteriorated considerably and its ill-effects are becoming apparent from the rising incidence of rail breakages and imposition of speed restriction on increasing lengths of track. We view this matter with great concern and would strongly recommend that no efforts should be spared in solving this problem in all its aspects. It is disconcerting to note that against Railway Board's own estimate of requirements of funds for track	This is an observation.

	renewals of Rs. 560 crore during the quinquennium 78-83 only Rs. 350 crores are stated to have been tentatively earmarked for this purpose we understand that this matter has also been taken up by the Railway Board with, the Planning Commission We do hope that the Railways full requirement of funds for track renewals in the coming years will be made available so that the arrears are wiped out at the earliest.	
85	Two branch lines, which are owned by private companies and are worked by the Northeast Frontier Railways, i.e., Chaparmukh Silighat (83.67 kilometers) and Kataghal-Lalaghat (38.10 kilometers) are being maintained with great difficulty at a restricted speed of 25 kmph and 15 km/h respectively, due to overdue track renewals, as the concerned company is not willing to share the cost of replacement Since this is an important matter concerning the safety of train operation, we	Both the Railway lines had been nationalised and necessary instructions were issued to N.F. Railway to take over the assets of the two companies operating these lines necessary steps had also been taken for the track renewals on these branch lines.

	would like to impress upon the Railway Board the need to take special steps to complete track renewals on the above mentioned lines on an urgent basis.	
86	While the Wanchoo Committee had suggested reduction in the percentage of unserviceable sleepers to the barest minimum, we find that a significant length of track continues to have more than 20 per cent unserviceable sleepers This recommendation has, therefore, not been implemented.	Efforts had been made in this regard However, keeping in view its continuous nature/process, the recommendation was treated as implemented.
87	Against 1247 badges treated as distressed at the time of the Wanchoo Committee, the number over a period of 10 years has creased to 3553 The sharp increase in the number of distressed bridges is disquieting A special programme designed to complete the rehabilitation of these bridges within a specified time is, therefore called for.	Within the available resources all the essential works of the replacement rehabilitation of distressed bridges were being undertaken A time hound programme was not possible in view of as continuous process.
88	A uniform concept of what a distressed bridge	Adequate guidelines in this regard exist in

	implies is still lacking We consider that, for a correct appreciation of the magnitude of the problem of rehabilitation of distressed bridges, a definition of the term distressed bridge is called for.	the Indian Railways Way & Works Manual Any further instructions in trying to bring about uniformity in the definition of distressed bridges would ad as constraint on the local engineering officials.
89	We find that the evolution of a rational formula for determining the gang strength has been considerably delayed and the Wanchoo Committee's recommendation remains unimplemented. The Railway Board should direct the gang strength committee to submit its recommendations expeditiously and finalise the issue speedily.	Accepted. The report has been considered by Government and issue has been finalised.
90	We find that the recommendation of the Wanchoo Committee for making available one curve corrector on each division is still to be Implemented. The usefulness of the curve corrector having been proved in field trial; we consider that the Railway Board should take steps to expedite its development and make them available on each division of the	Position received from the Railways in 1985 reveals that almost all the Railways were having curve correctors either equal to their number of divisions or more. However, instructions were also issued under Board's letter No.80/WTM/22/17/6 dated 07.1986.

	Railways.	
91	Though annual testing of track by ultrasonic means has not been introduced on all track as recommended by the Wanchoo Committee, substantial progress in this direction has been made. Due to the increasing arrears in track renewals and rise in the incidence of rail breakages, we consider ultrasonic testing an essential and effective means of ensuring safety and efficiency of train operation. We hope that with the receipt of additional rail flaw detectors, not only will the periodicity of testing be increased, but increasing the length of tracks will be covered by ultrasonic testing.	Noted.
92	During the 5 years period from 73-74 to 77-78, the number of rail fractures on running lines of Indian Railways had almost doubled, compared to those during the period 63-64 to 67-68. Except on the Eastern, North Eastern and Southern Railways, the number of rail fractures has increased on all the other Railways. The increase on the Northern,	As already stated in the views, the main reason for increase in the incidence of rail fracture was backlog of track renewals due to inadequate allotment of funds. However, ultrasonic testing on the main line had been extended over all Railways to detect rail flaw and more and more emphasis was being laid to cover maximum ultrasonic

	Northeast Frontier, South Central and South Eastern Railways is disquieting. Each rail fracture in the running lines is a potential hazard to the safety of trains. We would, therefore, urge the Railway Board and the Railway Administrations to take effective steps so that flaws in rails are detected in time and the defective rails are removed from track before these develop into fractures.	testing Being of continuous nature, the recommendation was treated as implemented. As per the position in November 1985, 37 more USFD machines had been purchased during last three years and a contract had at that time, arrived at for the purchase of additional 76 machines. In 1981-82, 25015 kms track was tested this way brought to a figure of 35960 kms. in 1984- 85.
93	We find that there is a wide disparity in the number of broken rails as given in the accident statistics published annually by the Railway Board and the number of rail fractures on running lines as advised to us by the Railways It would appear as if all fractures occurring on running lines on the Indian Railways are not being reported as accidents. The Railway Board and the Railway Administrations should look into this discrepancy in reporting and compilation of accident statistics and take necessary corrective action.	Necessary action has been completed on the recommendation which had been enlightened in the views extracted below. "The matter has been examined. Since the purpose of the compilation of the two sets of information is different, the numbers of rail failures are also different, i.e., in one case the rail fractures detected by P.way staff, in the normal course are excluded while in other cases, these are also included. There is no discrepancy in reporting and compilation and as such, no corrective action is

		required"
94	We note that from 18 tie-tamping machines in 1968, their number increased to 50 in 1978. Mechanised maintenance has been extended to cover 5000 kms of track on trunk routes and main line of all except the North Eastern and Northeast Frontier Railways We commend the progress so far made in mechanisation of track maintenance and hope that the same would be maintained.	No comments. This is an observation.
95	The position regarding traffic blocks for the mechanised maintenance of track, leaves much to be desired and the Wanchoo Committee's recommendation has not been fully implemented It has been admitted by the Railway Board as well as the Railway Administrations, that for various reasons has not been possible to give adequate traffic blocks required for working of on track tie tamping machines. It is inevitable that, in the circumstances, maintenance will suffer and the cumulative effects of this over a period of time will have a vital bearing on safety. The	The O.R study of optimum utilisation of on track Machines had been completed. A view had been taken it should be left to the GM's to decide about the duration of blocks to be provided on different sectional the sectional capacities and the volume of traffic.

	position will get further aggravated with increased use of concrete sleepers. The need for granting regular traffic blocks of sufficient duration on day to day basis cannot, therefore, be over emphasised Ways and means to arrange this must be found	
96	We are happy to note that between 1970-71 and 1977-78 the length of track monitored by track recording cars on the BG has increased nearly two-fold from 39,557 to 74,748 track kilometres, on the MG from 2,730 to 8,000 track Kms. We hope that this progress will be maintained and increasing length of track would be brought within the scope of monitoring by track recording cars.	Noted This is an observation
97	We agree with the view of the RDSO and the Noted. This is an observation. Railway Board that no useful purpose would be served by equipping each division of the Railways with a Hallade Track recorder	Noted This is an observation
98	The stand now taken by the Railway Board	There has been no reversal of the stand

	that the custody of stores is an inseparable part of the duties of permanent way and signal inspectors and that they cannot be divested of this responsibility is a reversal of their stand on the recommendations made by the Kunzru Committee in 1962. In view of the fact that this matter has engaged the attention of three high level Railway Accident Enquiry Committees, Le, the Shahanawaz Committee -1954, the Kunzru Committee-1962, and the Wanchoo Committee 1968, we feel that such an important issue should not have been decided only on the basis of the views of the Pay Commission Thus, the Wanchoo Committee's recommendations remains unimplemented.	taken by the Ministry of Railways on the recommendation made by the Kunzru Committee 1962 and Wanchoo Committee 1968. The advantages of relieving the permanent way and signal inspectors of the stores charge were recognised and relief has been provided by posting stores clerk under them.
99	We find that the recommendation of the Wanchoo Committee, that some norms should be fixed for deciding whether a particular unmanned level crossing should be manned and whether a manned level crossing requires upgrading, has not been implemented. The need for laying down appropriate norms for	Norms for manning of unmanned level crossing have since been issued. Procedure for determining need for additional gatekeepers at manned level crossings, has already been laid down and is being followed by the Railways. Laying down norms for upgradation in the structural

	manning of unmanned level crossings and upgrading of manned level crossings cannot be over-emphasised. Considerable delay in this regard has already taken place and norms should be laid down as recommended by the Wanchoo Committee, without further delay.	classification of level crossings, is not, however, considered feasible. This is decided jointly by Rail and Road Authorities, taking into consideration the local factors.
100	The recommendation of the Wanchoo Committee that in no case should a gate remain with only one man on duty all the 24 hours has been substantially implemented	This is an observation.
101	The overall utilisation of the 90 per cent and 10 per cent of the Railway Safety Works fund upto March 1979 had been only 42.6 per cent and 55.7 per cent respectively, 90 per cent Railway Safety works fund of the share of West Bengal remains unutilised since 1966. In Uttar Pradesh, Madhya Pradesh and Bihar also, despite a substantial network of the railway system, the utilisation of this fund has been poor. Provision of road over-bridges and under-bridges and manning or upgrading of level crossings will undoubtedly improve the safety of rail and road traffic at level	Necessary instructions had been issued to Zonal Railways under Board's letter No.80/W-1/AC/3/Pt., dated 14/4/1981.

	crossings. Non-utilisation of the aforesaid fund defeats the very purposes for which this fund has been set up. In our opinion there appears to be need for more persistent efforts on the part of the State Governments and the Railways to utilise the 90% Railways Safety Works Fund in the shortest possible time. Utilisation of the 10 per cere Railway Safety Works fund depends. primarily on the Railways themselves. The Railway Board should ensure that each Railway plans for a sufficient number of works of manning of unmanned level crossings and upgrading of manned level crossings in their annual works programme for full utilisation of the 10% Railway Safety Works fund.	
102	The Wanchoo Committee had recommended provision of telephone communication at all med section manned level crossing The Railway Board had issued instructions for provision of telephone facilities at all Special A and B Class level crossings and only such of the C Class manned level crossings on	its implementation was of continuous nature, as also necessarily to be phased hence, treated as implemented.

	Rajdhani routes as are in the block section and are normally kept open to road traffic According to the information furnished to us by the Railway Board, all Special class level crossings have been provided with this facility The information from the Railways, however, shows that 24 Special Class level crossings are yet to he provided with telephone communication and a substantial number of A and B Class level crossings have not been provided with this facility so far. Thus, this recommendation still remains to be fully implemented. The Railway Board should complete this long outstanding work at all mid- section manned level crossings on a time-bound programme.	
103	Implementation of the Wanchoo Committee's recommendation regarding provision of lifting furriers at all important level crossings has necessarily to be phased We would urge the Railway Administrations to take up this work on a time bound basis, giving priority to important level crossings.	Instructions were issued under Board letter No. 77/W-3 /SG/LX/2 dated 16-3-1979 The Railways were progressively providing the same along with interlocking of Level Crossings

104	The first trial with automatic half-barriers which was carried at Unnao on the Northern Railway in September 1972 was found to be satisfactory No further trials could, however, be carried out due to considerable differences of opinion and reluctance on the part of the Railways. The police authorities have also not favoured such trials in metropolitan areas.	Not accepted. Such automatic half barriers are not suited for Indian conditions especially in view of son traffic on many of the non suburban sections away from the Metropolitan cities.
105	Since 1968-69, 637 level crossings have been interlocked with signals on all the Railways Implementation of this recommendation covering Increasing number of level crossings, is necessarily a continuous process. However, we find that some level crossings on the suburban sections of the Eastern and South Eastern Railways still remain to be interlocked. On the Eastern Railway 23 Class level crossings, where the track is on a curve, also remain to be interlocked with signals we would urge these Railway Administrations to complete the work of interlocking of gates with signals at the above noted level crossings on priority.	Noted. In view of the fact that the important level crossing gates had since been interlocked, the recommendation was treated as implemented.

106	Good progress in the provision of colour light signalling has been made and the number of stations provided with colour sight signalling has increased from 331 in 1968-69 to 1007 in 1977-78 The implementation of this recommendation is a continuous process and we hope that this progress will be maintained and even Improved	Noted. This is an observation
107	Although the Railway Board had accepted the recommendation of the Wanchoo Committee regarding electric lighting of semaphore signals and trials on some Railways had shown satisfactory results and proven the effectiveness of this measure for improved lighting and visibility of signals, the progress made in the last eight years has been unduly Slow The Railway Board should take steps to complete this work on a time bound basis.	In view of reliable power supply not being available in most of the sections and multiple aspect colour light signalling being provided on the trunk and mainline, routes, provision of electric lighting of semaphore signals as an interim measure was not done. However, with the recent development of photo cell operated electrically it signal lamps, i would be possible to provide electric lighting of important semaphore signals subject to funds being available at least on sections where multiple aspect colour light signalling is not programmed (About 75% of the Semaphore signals, planned to be done, had already been

		electrically lighted. In view of the considerable thrust given by S&T Directorate, the recommendation was treated as implemented in 1988)
108	Multiple-aspect signalling still remains to be provided at 12.5 per cent of the stations on the broad gauge and metre gauge trunk routes and 65 per cent of the stations on the main lines of bon gauges Although the implementation of the Wanchoo Committee's recommendation in this respect has necessarily to be phased, we would urge the Railway Board to take up the provision of multiple aspect signalling at the remaining stations on trunk routes and main lines as early as possible.	Its implementation was a continuous process and necessarily to be spread over a long period.
109	There has been no significant progress in the implementation of the Wanchoo Committee's recommendation regarding separation of warmer signals in the rear of outer signals The separation of the warmer signal from the outer signal has a very important bearing on safety. The recommendation of the Wanchoo Committee having been accepted, should be	Railways had not come up with a proposal of separation of Warner Signal which indicated that they do not consider it necessary MAS w however, being provided progressively.

	implemented with a greater sense of urgency.	
110	We understand that there still remain considerable deficiencies in the visibility distance for the first stop signal provided in 2-aspect signalling as well as in the inter-signals distances in 2 aspect and multiple-aspect signalling and these do not conform to the emergency brake distances as determined by trials.	Some decisions were taken by the Board in this regard However, keeping in view its continuous process and long term nature, the recommendation was treated as implemented
111	We find that except for the high-speed routes, the question of re-siting of signals on the basis of the results of braking distance trials on the remaining sections does not appear to have been taken up so far. Inter-signal distances have considerable bearing on safe running of trains and the need to re-site signals on the basis of braking distances cannot be over emphasized. We understand that this matter along with other inter-related issues are presently under the consideration of the Railway Board, which should take a very early decision and ensure its speedy	Same as against item No. 110.

	implementation.	
112	It is a matter of serious concern that the implementation of the Wanchoo Committee's recommendation for providing suitable reflective material, like scotchlite, on sighting boards having a direct bearing on safety of train operation has been considerably delayed on the ground of lack of foreign exchange. We feel that there has been a lack of sense of purpose and urgency when the one alternative which was being developed indigenously has been found unsatisfactory in performance Considering that the requirement of foreign exchange for import of this maternal cannot be very large and that scotchlite reflective maternal is being used extensively by other Govt departments and public sector undertaking in the country e.g. roadways, air lines etc as also the relatively easier availability of foreign exchange, there is no reason why this should not be imported by the Railways also, even at this stage.	Necessary instructions issued to Zonal Railways Since 5 Railways had already completed this you, the recommendation had been treated as implemented.

113	Compared to the average of 76 stations per Noted This is an observation year provided with track circuiting during the 5-year period 1963 64 to 1967-68, 139 stations per year on an average were track circuited during the 10-year period hum 1968-69 to 1977-78. During 1977-78 track circuiting was completed at 162 stations. This progress is commendable.	Noted. This is an observation
114	Besides 329 broad gauge and 98 metre gauge stations on the trunk routes and important mainlines where track circuiting work is still to be programmed, there remains another 169 broad gauge and 702 metre gauge stations on other main lines where no plans for track circuiting have been made so far. Thus, even the completion of track circuiting of run through lines on trunk routes and main lines is not yet in sight. Early action should be taken to get this work done on a time-bound basis.	This was of continuous nature and its implementation was to be spread over a period of time depending upon the availability of funds Hence, treated as implemented, in view of its ongoing process
115	In respect of track circuiting of all passenger lines at wayside stations, it has not been	This had already been implemented. The indigenous capacity was being increased. To

	possible to make much headway due to non availability of wooden sleepers, nor are axle counters available in adequate number instead There has been very little progress in the use of concrete sleepers in track circuiting works. Due to the unsatisfactory supply position of wooden sleepers, it is necessary that alternative like suitable concrete sleepers and axle counters are made available in the required numbers for completing the work of track circuiting and detection facilities at all stations where these are considered necessary.	meet immediate needs, import of axle counter had been arranged. It was not proposed to import axle counters for which indigenous equivalents were available, at least in 1982.
116	We find that the Railway Board is still going ahead with track circuiting between fouling marks despite clear recommendation of the Wanchoo Committee that this should be done between the block clearance points.	This had been closed keeping in view its continuous and long term process
117	Very little progress has been made in the provision of Automatic Warning and Stop System (AWS) even on the restricted scope accepted by the Railway Board. Out of 2,780 route kilometers programmed on trunk routes with speeds of 120 k/pH and over and 1,126	The work was at that time in progress for providing AWS on HWH Burdhwan chord and Main line sections of Eastern Railway and Churchgate - Virar section of Western Railway. Board had also taken a decision regarding the policy for introduction of

	route kilometers on suburban sections in Calcutta, Bombay and Madras areas, AWS has been provided only on 248 and 94 kilometers respectively. The poor progress in the last 15 years has been due to reluctance to import the equipment and to excessive time taken for its Indigenous development and manufacture of the AWS equipment. We consider that the Railway board should take steps to fulfil at least their diluted commitment of providing AWS on trunk routes and suburban sections at the earliest, In doing so, it will no doubt take full advantage of the available sources of supply in the country and undertake imports if necessary, so as to complete speedily this important safety measure. It is also necessary that a programme should be drawn up for extending AWS on all trunk routes with speeds of 100 k/pH and above, covering all passenger and goods trains.	AWS on trunk routes However, keeping in view the progress and the long term process the recommendation was treated as implemented.
118	We note that very little progress has been Wade in research and development in the	At that provision of cab signalling was n considered necessary except in the case of

	field of cap signalling in the last decade and the half after the recommendation was first made by the Kunzuru Committee. Technology in this sphere is continuously advancing and several systems are in use in foreign countries. The Indian Railways should take advantage of these developments and evolve a suitable system for use under Indian conditions	Ca development Howe working system w development However, the recommendation treated as implemented in view of its long term process.
119	As regards time blocks for maintenance of signalling equipment, the Railway Board did not accept the Wanchoo Committee's recommendation for making provision of fixed time blocks in the time table, nor have they offered any solution to this vexing problem which has serious repercussions on safety.	The Committee has stated that they would go we the matter further, in their subsequent report vide para 398.
120	The strength of officers and inspectors in the signal and telecommunication department on most Railways is not commensurate with the existing workload It is surprising that even after deficiencies in this respect had been brought out in the study undertaken by the	In view of the existing tan on creation of posts one form or the other, creation of posts in the supervisors and officers category in the Signal end Telecommunication department has not teen commensurate with the addition of assets.

	efficiency Bureau and accepted by the Railway Board, the Railways have been asked to rationalise the workload on the basis of the existing strength. It is disquieting that for the new equipment also, posts are not being provided as per the yardstick. Intensification of inspections apart, it would appear that even the extant schedules of inspection are not feasible due to inadequate strength of officers and inspectors. This is a serious matter to which we would draw the attention of the Railway Board and urge that immediate steps should be taken to rectify the situation and ensure that meaningful inspections by officers and inspectors of the signal and telecommunication dept are carried out. We consider that any economy in this regard would be misconceived.	Yardsticks have been issued after detailed study of the workload both for officers and inspections and efforts are being made to sanction posts at least for new assets as per the yardstick. Over a period of time is proposed to bring the strength of officers a supervisor in S&T Department in ice a yardstick so as to improve the periodicity and quality of inspections. In 1989 the S&T department had inter alia abused that certain limited posts are being sanctioned the scope of the administrative orders and continuous process.
121	We find that 65 stations on the broad and metre gauges still remain to be interlocked stations the opinion that even in the case of	Out of the 65 stations, 16 stations have already been provided with rudimentary interlocking/standard In f interlocking. The

	worked on river ghats or stations on sections worked under one engine only son sections precluded of a derailment at the system, the precluded if the stations are interlocked not therefore, reiterate what the Kunzru and Wanchoo Committees had suggested namely that rudimentary interlocking should be provided at all stations on the broad and metre gauges	remaining stations are either on s "one engine" only system or are situated on sections e with very light traffic or where speed is very low and at hence provision of even rudimentary interlocking is re not considered essential on such sections.
122	During 1976-77 and 1977-78 there had been an increase in the incidence of failures of signal and interlocking gears related to traffic density. We would urge the Railway Board to take steps to check the rising trend and bring down the failure rate. In case of block instruments the incidence of failures has shown some improvement.	Signal failure were being kept under constant review by the Railways and every effort was also being made to keep them to the minimum when the recommendation was treated as implemented.
123	The Northern Railway had the highest number of track circuit failures followed by the Western and Eastern Railways. These Railway Administrations should analyse the causes of failures and take steps to bring them down.	Since the track circuit failures were analysed and remedial measures taken by the Railways to avoid recurrence, the item was treated as closed.

124	The shortfall in overhaul of lever frames and block instruments and replacement of lever frames has sharply increased in recent years as compared to the position obtaining prior to 1970-71. According to the Railways, the main reason for this shortfall is non-finalisation of the yardsticks for maintenance staff and shortage of staff. This is a serious matter and if left un-remedied, can only lead to further deterioration and serious repercussions. Special efforts in this regard are called for on the Eastern, Southern, South Central and South Eastern Railways where the backlog of overhauling of lever frames has increased considerably during 1977-78 as compared to the previous year and needs to be brought down. Thus the Wanchoo Committee's recommendations for clearing the backlog of overhauling of lever frames and block instruments and replacement of lever frames not only remain unimplemented but there has been a distinct deterioration in the situation except in the case of replacement of block	The recommendation and views/decision of the Board, made in a work study report of March, 1982 of Eastern Railway on overhauling of Mechanical lever frames, had been circulated to zonal Railways under Board's letter No. 81/EB/1200/1 dated 11.2.85 for necessary action Implementation of this recommendation was also of a continuous nature.

	Instruments. We would urge the Railway Board and the Railway Administrations to take urgent steps to affect an improvement in this respect	
125	Regarding the Wanchoo Committee's recommendation for laying down yardsticks for determining the strength of block, electric and mechanical signal maintainers, the Railway Board decided that it would not be practicable for a big railway system like the Indian Railways to have a uniform yardstick and the Railways were advised evolve local yardsticks. Thus, the Wanchoo Committee's recommendation in this respect remains unimplemented.	Since the signalling on the various railways is quite different and the pattern of staffing depends on the local conditions, traffic density and type or equipment, it would not be possible to have a uniform pattern of staffing applicable uniformly for such large number of systems as the Indian Railways has, hence, for the present, each railway has to follow its own yardstick which has been evolved over a period of time. However, for new equipment like automatic warning system, axle counters etc, yardsticks shall be issued to be applicable to all the Railways. Norms for maintenance of axle counters had been issued to zonal Railways under Board's letter No. 78/W3/SG/9/3 dated 5 11.60.
126	Our analysis shows that as far as engine failures are concerned, the position of steam, desal and electric locomotives has been	Both the Mechanical and Electrical Directorate had shown their satisfaction over the al possible efforts being made to

	unsatisfactory and their performance has fallen much below the target laid down by the Railway Board It was decided that it would not be practicable for a big railway system like the Indian Railways to have a unform yardstick and the Railways were advised to evolve local yardsticks. Thus, the Wanchoo Committee's recommendation in this respect remans unimplemented.	prevent the engine failures on Indian Railways
127	The recommendation of the Wanchoo Committee regarding provision speedometers/speed recorders was accepted by the Railway Board, has still not been implemented and the Railway Board's claim in this regard is not corroborated by the information supplied by the Railways. The Railway Board must ensure that speedometers/speed recorders are provided on all locomotives working trains and no locomotive which is to work a train leaves the shed or yard without a speedometer/speed recorder in working order	in view of the policy decision taken by the Board to of fit all new main line locomotives with Haster speed recorders, the recommendation was treated as closed.
128	we find that even after 10 years, the Railways	All out efforts are being made to develop

	have no satisfactory design of a speedometer We cannot help feeling that if a more determined effort had been made by the Railway Board, a suitable speedometer could Pave been developed during this period.	electric/electronic type of speedometer recorder with indigenous firms like HPL, set & Day and EC and action has also been taken to request Mys, aster of Switzerland for technological collaboration for manufacture of their Hasler Speedometers in Railway Workshops and this would be further followed For the time being development is however, largely determined by the overall industrial infrastructure in the country and best action would be taken to compress it to the minimum possible This item was later re-classified as an observation However, a similar recommendation had been made by the Committee in PL. II of its report as item. 192
129	While the recommendation of the Wanchoo Committee for repositioning the speedometer on the control desk of metre gauge diesel locomotive or alternatively, providing another speedometer so that the driver can refer to it conveniently, has been implemented on some	The recommendation was fully implemented on Northern and Southern Railways. Western Railway had received the flexible shafts for repositioning the speedometer on the Central desk of M.G. diesel locos. This work was also likely to be

	Railways, it remains to be fully implemented on the Northern, Western and Southern Railway in spite of Railway Board's clear directive on the subject nine years ago.	completed in March 1985.
130	On the question of maintenance of speedometers, our review has shown that this set is a clear case where things have been allowed to drift and although ten years have elapsed since the recommendation, no appreciable headway has been made either in the manufacture of a suitable speedometer/speed for recorder or in the proper maintenance of the instruments which are presently in use. Thus, this recommendation of the Wanchoo Committee remains unimplemented. We hope that the Railway Board will now expedite the action proposed by them in this regard.	Central speedometer maintenance units have been up on the zonal Railways and supply of adequate spares is also being ensured. However, inadequate performance of the VDO speedometer due to its design deficiency has resulted in the present state of their maintenance and action is being taken already indigenous development of a suitable electric/electronic speedometer with indigenous firms, Collaboration with M/s Hasler for manufacturing of Hasler speedometers has also been requested as mentioned in remarks to 128 above This would be further followed up and in the meantime all new main line diesel locomotives are planned to be fitted with imported Hasler speedometers/speed-recorders.
131	We find that even though the provision of	In view of the recommendation No.190

	Drivers Vigilance Control Device on diesel and electric locomotives had been accepted as a policy by the Railway Board, a decade has elapsed and satisfactory design of vigilance control device for electric locomotives, suitable for Indian conditions, is still to be developed. While some diesel locomotives have been equipped with this safety device, none of the electric locomotives has been provided on diesel locomotives, in many cases it is found to be not in working order Thus, an important safety measure remains substantially unimplemented. We are concerned that it has also so far not been possible to get the drivers to accept the utility of this device, in spite of the fact that the study made by RDSO had shown that its operation did not generate fatigue and exhaustion in drivers to any significant extent which is likely to impair efficiency. We would urge the Railway Board to take urgent steps to equip all diesel and electric locomotives with drivers vigilance control	made in part II of the report of the committee, this recommendation had been treated as closed.

	device at the earliest if necessary, by resorting to imports till a successful indigenous design becomes available. It is also necessary that full cooperation of the drives is ensured by better educational propaganda and more frequent personal contacts	
132	There has been a gradual decrease in the No comments. This is an observation. holdings of steam locomotives due to progressive dieselisation and electrification during the last 15 years. In this background and with the steps taken by the Railway Board to give special attention to the maintenance of over-aged locomotives, perhaps a reduction in the time interval between two overhauls may not be necessary.	No comments. This is an observation.
133	The recommendations made by the Kunzru The Wanchoo Committees for adoption of a and a basis for fixing the time schedule for train examination and for determining the strength of examining gangs remain unimplemented This is a vital factor affecting the safety of train operations and we urge the	This subject had been reviewed and instructions on No 85/MON)/951756 at vide Board's lette No 352190/951/56 dated 28-11-1985 and MM's D of 5-2-1986.

	Railway Board to take a decision expeditiously and implement the recommendations as early as possible.	
134	We find that it has not been possible to Implement the recommendation of the Wanchoo Committee for adopting the Andal pattern of train examination due to various difficulties experienced by the Railways.	The Committee have stated that they would go into this matter further in the subsequent report, vide para 479.
135	The position of repairs to wagons in traffic yards and on trains is not entirely satisfactory. It is undesirable that wagons with rejectable defects should continue to remain in service though not permitted under the Conference rules, part III. We would impress upon the Railway Board to take steps and ensure that repairs to wagons on nominated lines and on trains in traffic yards are carried out satisfactorily.	All defects mentioned in IRCA Conference Rules part 111 are not necessarily related to safety A committee has been formed to study the rules so that those defects which are a hazard to safety are identified and the conference Rules modified.
136	We find that whereas the NF. Railway has indicated that machinery and tools in sick lines are provided on the basis of the Railway Board's instructions issued in 1954, all the other Railways have stated that the sick-lines	Instructions with regard to the provision/supply of USFD Machines in the major sick lines issued under Board's letter No 83/M(N)960/1 dated 21.1.87.

	are being equipped as per standards recommended by the Committee appointed by the Railway Board in December 1971. The Railways have also indicated the non-availability of certain types of equipment in the sick-lines We also find that ultrasonic equipment is not included in the standard lists of equipment prescribed either in 1954 or in 1971 Thus the sick-lines on the Railways are still not equipped fully with the requisite type of machinery and plant The Railway Board should take urgent steps in this respect.	
137	The system of neutral control examination of wagons is in force at 59 broad gauge and 19-meter gauge sick lines where wagons are turned out after obtaining neutral control fit certificates. From the results of checks made by the neutral control staff, we find that during 1976-77, 5.3 and 8.2 per cent of the wagons on broad gauge and meter gauge respectively, were found with rejectable defects at the time	The Railways' performance was being watched regularly in Board's office to ensure that wagons are not allowed to be turned out from workshops and major sick lines with rejectable defects. Being of continuous nature, the recommendation was treated as implemented.

	of final examination in sick lines. It is disquieting that even rejectable defects are not being fully attended to in sick lines. We also find that wagons are being turned out of sick lines without neutral control fit certificates, thus evading neutral control examination. IRCA reports have been consistently highlighting the particularly poor performance of sick lines at Rewari, Garhara, Gonda, Lumding, Katihar, Siliguri, Tinsukia, New Guwahati, Samastipur and Guntakal, where the repair procedures were found generally sub-standard. Thus, even where the system of neutral control examination of wagons is in force, a substantial percentage of wagons, is turned out without fit certification by the neutral control staff. This, in our opinion, is a serious matter, which the Railway Board should go into and ensure that no wagon is turned out without fit certification by neutral control staff in sick lines, where examination by such staff is in force.	

	It is clear that the recommendations of the Wanchoo Committee have not been implemented in any substantial measure. The Railway Board should take firm steps to see that wagons are turned out after completion of all stipulated repairs.	
138	We are concerned that primary and secondary maintenance of some passenger carrying rakes is still carried out on lines with high level platform on one side. We strongly feel that the practice of giving primary and secondary maintenance to coaching rakes on platform lines should stop forthwith and adequate facilities should be created at the stations to undertake the statutory maintenance schedules as prescribed in the conference Rules part IV.	Railways had been asked to submit their proposals starting with 1985-86 works programmes for modernising coaching maintenance depots and wagon depots during the 7 plans. Since the recommendation was of continuous nature and its implementation was also of a long-term process, the recommendation was treated as implemented.
139	Having accepted the Wanchoo Committee's recommendation, the Railway Board issued orders in 1969 that the practice of clamping and securing closed broken bearing springs on BOX wagon should be discontinued. We find that these orders are not being complied with	In the light of similar recommendation made in part II of the report (Item No. 224), this recommendation was closed.

	by the Railways.	
140	Large scale overloading of BOX wagons, up to the extent of 8 to 10 tonnes is a common feature at certain coal loading depots on the Eastern Railway. In some cases it was as high as 18 tonnes. It appears to us that this cannot happen except with the connivance on the part of some personnel on the Railways and the loading parties. Thus, the dangerous practice of overloading of BOX wagons not only continues unabated but has aggravated in last decade.	Necessary instructions were issued on various aspects of the subject vide Board's letter: i) TC-1/84/108/1 dated 26.8.85. ii) TC 1/86/109/14 dated 27.2.87. iii) TC-1/87/100/7/3 dated 12.8.87. The weigh bridges at 9 colliery sidings in Korea-Rewa coal fields and 2 on karampura coal field had since team modified to suit weighment of BOK-N wagons an electronic weigh-bridge had been installed at Bachra colliery. Action was also being taken by Coal India Ltd. to provide new weigh bridges or modify the existing ones.
141	It is a serious matter that in spite of strong objections by the RDSO and the Commission of Railway Safety, the practice of overloading BOX wagons as a regular measure to the	There were no instructions at that time in force to load beyond CC two tonnes when the recommendation was closed in September 1982

	extent of 2 tonnes over and above the carrying capacity has been allowed to continue. Further, higher axle loads on BOX wagons are being permitted in contravention of the Conference Rules, part III. We are of the view that the Railway Board's directive permitting overloading beyond the carrying capacity by 2 tonnes, as a regular measure would seriously affect safety and feel that this needs to be reviewed urgently at the highest level, in consultation with the RDSO and the Commission Railway Safety.	
142	In the case of coaching stock on the broad and metre gauges, after a rise in the incidence of hot boxes during 1974-75 and 1975-76, there has been a steady fall in the last two years of our survey. During 1977 78 the all Railways' average incidence of hot boxes on coaching stock per 10 million vehicle kilometres was 0.43 on broad gauge and 1.94 on metre as against the Railway Board's target of 1.0 on both gauges. On the broad gauge of Northern, South Central and South Eastern Railways	Zone-wise figures are not true index of a particular Railway's performance, as the coaches owned by may run on a number of Railways. Only the overall figures of Hot Boxes should be considered These, as the Committee have noted, are coming down.

	there has been an increase in the incidence of hot boxes on coaching stock during 1977-78 as compared to the previous year; on the metre gauge, none of the Railways were able to achieve the target of the Railway Board during 1977-78; on the other hand, the incidence of hot boxes had gone up on the Southern, South Central and Western Railway as compared to the position obtaining in the previous year. We would urge these Railways to take necessary steps so as to bring down the incidence of hot boxes.	
143	The overall incidence of hot boxes of goods stock per million wagon kilometres on the broad gauge has been steadily falling except during 1977-78 when there was a slight increase on some Railways as compared to the target. On the metre gauge there has been a decline in the incidence of hot boxes on goods stock except for two intervening years 1974-75 and 1975-76 when there was an increase. Except the Southern and South-Central Railways no other Railways could	As mentioned against recommendation No. 142 only the overall Indian Railways' performance should be considered as the Good Stock is extensively pooled. The all-Railways performance has shown improvement as noted by the Committee.

<table>
<tr><td></td><td>keep within the target of 0.5 hot boxes per million wagon kilometres stipulated by the Railway Board. The Northern, North-Eastern, N.F and Western Railways should take effective steps to bring down the incidence of hot boxes on metre gauge goods stock within the target stipulated by the Railway Board.</td><td></td></tr>
<tr><td>144</td><td>We find that the principal causes of hot boxes on coaching and goods stock on both the broad and metre gauges continue to be the same as found by the kunzru and Wanchoo Committees, namely, dry packing, badly fitted brasses, uneven loading or overloading, water or dirt contaminated packing, badly metalled brass, etc. These areas of maintenance of rolling stock, therefore, call for greater attention.</td><td>Instructions had been issued to the Railways vide Board's letter No. 82/M(N)/18/7 dated 10.8.82. Other steps taken in this regard by the Mech. Directorate also resulted in appreciable improvement which is evident from the following figures:

<table><tr><td>Year</td><td>BG Chg.</td><td>MG Chg.,</td><td>BG Goods</td><td>MG Goods</td></tr><tr><td>1962-63</td><td>2.62</td><td>6.39</td><td>11.95</td><td>4.59</td></tr><tr><td>1975-76</td><td>0.53</td><td>4.29</td><td>8.86</td><td>1.46</td></tr><tr><td>1980-81</td><td>0.49</td><td>2.19</td><td>3.57</td><td>1.04</td></tr></table></td></tr>
<tr><td>145</td><td>We may point out that due to the increasing</td><td>Suitable instructions were issued to the</td></tr>
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	number of coaches and wagons fitted with roller bearings which are being put in to service on the Railways, the overall incidence of hot boxes in relation to vehicle/wagon kilometres is bound to come down. We would therefore, caution the Railways against complacency in this regard and urge that steps should continue for bringing down further the incidence of hot boxes on coaching stock and wagons on both broad and metre gauges. Also the targets may need to be appropriately revised.	Railways vide Board's letters No.82/M(N)/16/8 dt. 23.6.83 and 30.6.84. In view of the improvement in the position of Hot Axles on most of the Railways, the recommendation was treated as implemented in May 85.
146	We are sorry to note that though more than a decade has elapsed an indigenously developed hot box detector appears nowhere in sight. With the trend towards long distance and high speed trains the need for detecting hot boxes in time cannot be over emphasised. We find that hot box detector is still under development. In the wake of increasing use of roller bearing and the introduction of more and more fast nonstop trains, it would be desirable to develop a hot box detector device	146 and 158: One hot box detector developed by B.E.L, Ghaziabad was fitted on S.E.Railway for trial purpose. The trials had been found to be satisfactory. RDSO had been asked to prepare specifications so that 50 hot box detectors could be purchased.

	at the earliest.	
158	We find that hot box detector is still under development. In the wake of increasing use of roller bearing and the introduction of more and more fast nonstop trains, it would be desirable to develop a hot box detector device at the earliest.	It was also decided by the Board that GM's should institute a small reward to railway employees who detected hot boxes on the run. It was also agreed that Mettaguda Workshop should develop capacity to manufacture HBDs incorporating latest technology
147	Checks on effective brake power by neutral control staff had shown that only 12 percent of the originating trains and 1 percent of the terminating trains had effective brake power of stations 85 percent and above. We cannot escape the conclusion that most of the trains leave originating points with effective brake power much less than the prescribed minimum and the position becomes worse on the run. These results belie the claims made by most of the Zonal Railways that the	Instruction had been reiterated vide Board's letter No 79/M(N)/951/30 part-11 dated 167 1982 to ensure the proper brake power at the originating stations.

	prescribed break power is available on all goods trains The Railway Board's own directive in this regard is, thus, not being followed and the recommendation of the Wanchoo Committee remains unimplemented. The safety of a train is endangered when its brake power is poor and it must be ensured that trains leave the originating points with at least the minimum stipulated effective brake power.	
148	In a number of cases the trains were started without recording on the certificate the vacuum available in the engine or the brake van. In some cases, fictitious readings of vacuum in the brake van were recorded. We consider absence of vacuum gauges in the rear brake vans and incorrect preparation of brake power certificates to be highly disconcerting features We would stress that effective measures should be taken to ensure that vacuum gauges are invariably fixed in the rear brake vans and that they are in working order and the brake power certificates are	Instructions were issued to Zonal Railways under Board's letter No. 80/M(N)/951/45 dated 10-7-1981 and 78/M(N)/951/26 dated 16-7-1982.

	correctly prepared.	
149	In respect of the Wanchoo Committee's recommendation that a satisfactory solution far. should be evolved to overcome the difficulty of stopping diesel hauled goods trains, the Railway Board had stated that detailed tests have shown that no modification was required in the brake circuitry of the diesel locomotives The Railway Board, therefore, felt that this recommendation did not call for any further action.	This is an observation No further action was called far.
150	The Wanchoo Committee's recommendation to give Identifying marks on all anti telescopic coaches has been fully implemented. In the course of our examination, it has also come out that even the extant instruction of the Railway Board of marshalling passenger trains are not always followed The Railway Board should ensure that passenger trains are run with the stipulated marshalling order of coaches.	All the Railways had confirmed that trains are run with the stipulated marshalling orders of coaches as indicated vide Board's letter No.76-chg 11/14/1 dated 4 .6. 1977
151	We find that all 4-wheeler brake vans on broad and metre gauges have so far not been	Instructions were issued under Board's letter No 82/M(N)/951/44 dated 10.8.82, which

	equipped with modified spring arrangements although the instructions to do this effect were issued more than 8 years ago.	had also been reiterated vide Mech NO.86/M(N)/951/44 dt. 23.7.86 Directorate's letter
152	The backlog of POH of coaching vehicles on the broad gauge was comparatively higher on the Eastern, Northern, Southern, South Central and South Eastern Railways. On the metre gauge, the backlog of POH of coaching vehicles on the Northern, Southern and South Central Railways was considerably higher than the all Railways average.	Keeping in view the considerable progress made in respect of clearing backlog of POH, due stock and further continuing attempts, the recommendation was treated as implemented in December 82
153	On the broad gauge, the percentage of wagons overdue POH on the Central, Northern and Western Railways were higher than the all Railways average. On the metre gauge, the percentage of the Wagons overdue POH on the Northern and South Central Railways was considerably higher than all the Railways average. These Railway Administrations should take steps to bring down the arrears in POH of wagons.	Same as indicated against item No. 152 above.
154	In the face of continuing arrears in POH of wagons on almost all the Railways, the	No instructions of advancing POH dates existed at that time, against an average out

	Railway Board have surprisingly issued instructions to the Railway Administrations to temporarily advance POH of wagons by 6 months so as to enable adequate supply of wagons to workshops for POH to avoid under utilisation of the available POH capacity. In our opinion such a step can be justified only after POM in arrears have been fully liquidated on all Railways. If spare POH capacity is available on some Railways, it should first be utilised for clearing the arrears on other Railways to the extent possible.	turn of 7455 per month in 81- 82, June 82's out turn had been 8327 and efforts were being made to liquidate arrears when the recommendation was treated as implemented.
155	We find that during 1977 the rate of failures of spherical roller bearings on ICF broad and metre gauge coaches increased to 3.25 percent and of cylindrical roller bearing on BEML broad gauge coaches the rate of failures was 0.531 percent. The incidence of failures of roller bearings on BOX wagons had also gone up to 0.75 and 1.06 percent during 1976 and 1977 respectively as compared to 0.05 percent during the period 1966-67 to 1968-69.	The maintenance of roller bearings was receiving constant attention. The committee itself had noted that a number of roller bearings were rejected in workshop after a thorough inspection. In case of ICF stock a design change has already been effected in as much as directly mounted roller bearings are used instead of sleeve mounted bearings

	We feel that the maintenance of roller bearings has not received the attention that it deserves thereby resulting in increase in the rate of failures of roller bearings and deterioration in position since the appointment of the Wanchoo Committee. The Railway Board should take effective steps in this matter.	
156	Dust-proof rooms for overhauling of roller bearings remains to be provided in workshops on some Railways. The Railway Board should ensure that those facilities are provided without delay.	Almost all workshops had dust proof rooms and where they did not exist, action to provide the rooms had already been initiated.
157	The Railway Board had not accepted the suggestion of the Wanchoo Committee for adopting a system similar to that on Japanese National Railways for attention to roller bearings in workshops. Considering that there has been an appreciable increase in the rate of failures of roller bearing on the last decade, an 1) in-depth study of the extant maintenance practices is called for.	An in-depth study of the extant maintenance practices was a regular and continuous process for roller bearings. However, the additional steps the had taken at that time to reduce the incidence of bearing failures are spelt out below. i) Sodium based grease has been replaced by superior lithium-based grease. ii) Roller Beaning overhaul is being strictly

		monitored in workshops where adequate facilities have been generated. iii)Interchange of wheels in sick lines without bearing overhaul has been strictly prohibited iv)Periodicity of bearing overhaul has been prescribed and vehicles running overdue POH/IOH/ROH are given due attention.
159	Neutral control examination of coaches after POH in workshops is in force only at 17 out of total of 31 workshops where repairs to coaching stock are undertaken. The results of checks made by neutral control staff during 1978 show that the percentage of coaches detained due to non-completion of repairs at the time of outgoing inspection was still high in the case of some workshops. As compared to the position in 1978, there has been some deterioration in the case of certain broad gauge workshops The Wanchoo	Since the submission of the report, 2 more workshops had been covered by neutral contra examination. It was the accepted policy of the Railways. Implementation of this recommendation was of continuous nature and the performance of Zonal Railways was being closely watched and monitored by the Mechanical Directorate.

	Committee's recommendations, thus, remain unimplemented. The Railways must take effective steps to improve the quality of workmanship in the workshops and bring down the rejections at the stage of final examination by neutral control staff.	
160	The percentage of coaches sent out of workshops without obtaining neutral control fit certificates was quite high in some workshops. It is disquieting that in the case of broad-gauge workshops at Matunga on the Central Railway, Kharagpur on the South Eastern Railway and metre gauge workshops at Gorakhpur on the N.E. Railway, New Bongaigaon on the N.F. Railway, the number of coaches passed locally without obtaining neutral control fit certificates had increased during 1978 as compared to 1970.	Implementation of this recommendation was of continuous nature and the performance of Zora Railways was being closely watched and monitored by the Mechanical Directorate.
161	We also find that in some workshops where the percentage of coaches detained by neutral control staff due to non-completion of repairs	Same as Indicated against item 160 above.

	was high, the percentage of coaches passed without obtaining neutral control fit certificates was also high. The workshops at Matunga (CR), Alambagh, Lalagudda, Kharagpur on broad gauge and Gorakhpur and New Bongaigaon on the metre gauge stand out glaringly in this respect. The Railway Board should look into this and take urgent corrective action.	
162	The maintenance of rolling stock has shown signs of deterioration in recent years. In the interest of safety of trains operations. It is necessary that every effort should be made to improve the condition of rolling stock Extension of the neutral control examination would appear to be an effective means to ensure this. The Railway Board is already seized of this matter, and we would stress the need for an expeditious decision.	Though, the extension of neutral examination to yards is not accepted, the concept of 'good and improved maintenance is to supply defects-free wagons for as long a time as possible. This requires quality repairs, the necessary pre-condition for which are(i) adequate machinery and plant(i) adequate supervision and (iii) adequate and independent quality check. These are available in workshops and major sick-lines where neutral control examination would produce effective results. Workshops have already been provided with Neutral Central Examination and important sick

		lines are also being covered by it.
163	The performance reckoned in terms of the percentage of wagon units with unattended rejectable defects by which the Railway Board indicated an improvement in 1967-68, has slipped back to the level obtaining in 1963-64. It is also clear that the high percentage of wagons found with rejectable defects has been persisting over these years on all the Railways.	This is an observation-No action is called far
164	Spot checks conducted by neutral control flying squads during the period 1974-75 to 1976-77 show that a large number of wagons with rejectable defects having a direct bearing on safety, were left unattended on the broad and metre gauges. It is a matter of concern that even after the wagons have been attended to by railway staff, a very high percentage of these remained with such defects. The spot checks, though limited in nature, show that a large number of wagons are running with such defects. This reveals a serious state of affairs and calls for urgent corrective action.	Instruction on the subject were issued under Board's letter No. 83/m/951/21 dated 30.3.83 and 6.5.83. Its implementation being of continuous nature and the performance of zonal Railways being closely watched and monitored by the Mechanical Directorate, the recommendation was treated as implemented.

165	The figures in respect of over aged coaches and wagons show that there has been reduction in their number on both the broad and metre gauges. From the age-wise information of the over-aged coaches furnished by the Railways, we find that a substantial percentage of the over-aged coaches has exceeded the codal life by as much as 20 years on the broad and metre gauges We hope that priority would be given to replacing these over aged coaches.	This is an observation. No action is called far.
166	We find that double ended sidings for stabling of medical cans have not been provided at 12 stations on the Railways The question of providing such sidings has been with the Railways for more than 15 years We find no Justification for the failure to implement this accepted recommendation.	Instructions issued under Board's letter No.79/W 1/SA/19 dated 7.8.82. Keeping in view the progress made in this regard the recommendation was treated as implemented in 1985.
167	Nanow gauge lines are still being worked with increasing preponderance of over-aged locomotives and rolling stock, there are also heavy anears of track renewals We consider	In respect of rolling stock, inputs are being made to replace over aged stock on NG lines. It is also ensured that maintenance of even over aged stock is properly done, and

	that to continue to work them under these conditions is hazardous. They must, therefore, either be closed down or fully rehabilitated. The Government should take an early decision in the matter.	unsafe working is not allowed. As axle loads, speed and density of traffic on narrow gauge lines are very low, large scale track renewals are neither necessary nor carried out. As regards closure of uneconomic branch line the matter of 23 such lines was taken up with the state government but they did not favour it. However, decision taken in a meeting in 1985 with C.E. Director is appended below:- "This recommendation is regarding heavy arrears of track renewals on the Narrow Gauge and closure of un-economic branch lines. This may be treated as Implemented."

168	We note that at present only a skeleton documentation section is functioning in the RDSO, and expansion of the scheme has been deferred due to financial stringency. Thus, the recommendation of the Wanchoo Committee remains unimplemented. We feel strongly that the absence of a well-equipped and modern documentation section is a severe handicap to any research organisation, more so to the only such institution in the Railways. Economy in this case only hampers the effectiveness of the research organisation and hence proves to be self-defeating.	Since the augmentation of the cell has been accepted in principle and the implementation held up only because of the ban on new posts, the recommendation was treated as closed
169	Operations research has not far, been by the Railway to improve the standard of safety as was envisaged by the Wanchoo Committee. This recommendation, therefore, remains unimplemented. We feel that operations research will be a useful tool to improve the standard of safety in train operations and urge the Railway Board to take effective steps in this direction. The setting up of Operations	Instructions were Issued on Railways redes Sikri Committee-Part-1 Contd. Instructions were/0R/10 dated 3.5/1985

	Research Cell on the Railways will be a step in the right direction and should be expedited.	
170	In our view the setting up of a vehicle dynamics test rig and the laying of test-track are essential to evaluate the performance of various design concepts to the limits of their operating capabilities under controlled and simulated conditions. We would impress upon the Railway Board the need to give priority to the setting up of these facilities at the earliest.	The need for a vehicle dynamic test rig facility to enable in-depth study of rail/wheel dynamics is keenly felt since on-line testing of prototype vehicle is both costly and time consuming. The anticipated cost of such facility is Rs. 6.34 crores approximately. The proposal is not processed further due to paucity of funds. The test track facility was included in the Budget for 1986-87.

PART-II

Item No.	Recommendation/observation made by Railway Accidents Inquiry Committees, 1978	Action taken.
1	The Railways should set up speedily an adequate personnel management organisation manned by persons with proper professional training and the right aptitude, and such organisation should reach all levels and points on the Railways at which administration has to deal with large number of employees	Accepted. In fact, a service known as "Indian Railway Personnel Service had been constituted, so that Personnel Management may be brought under this service for looking after the welfare of railway employees and also to improve the efficiency of this Department on the Railways as a whole. Officers of this Service are exposed to various training courses available on the Railway institutions as well as outside Institutions on the subjects of Management Development, Industrial Relations, etc.
2	The departmental officers and supervisors who have to lead, take work from and look after the problems of workers, should be	Man, management is an integral part of the training programme of all officers and supervisors whether they are from

	adequately exposed to the various subjects, concepts and skills in the area of management of people.	Personnel Service or other departmental Services.
3	An effective personnel management organization backed up by an attitude of scrupulous fairness and a genuine concern for the workers as people should provide administration with the capability of dealing with the factors leading to erosion of discipline and decline in work standards**.**	(Please see remarks under Item-1.)
4	There should be only one recognised employee's union on each railway with a recognised federation at the apex.	RRC also pointed out that such a change must come from the Unions themselves. At that time there did not appear to be any likelihood of such a proposal.
5	The only way of discouraging category-wise unions seems to be for the Administration to ignore them entirely, taking care at the same time to speedily resolve the problems of different categories of workers when these are brought up through the recognized unions. Administration must consciously build up it capability to cope with the temporary	Noted.

	dislocations in operations forced by the category-wise unions.	
6	Membership of supervisors in staff unions is not consistent with the position of supervisors as a part of the management. The exact modalities of how this is to be achieved requires consideration by the Government.	Not possible of acceptance at that time in view of the Trade Union's Act provision and legal implications.
7	Firmness is as important as fairness and sympathy in Administration's style and strategy for dealing with its employees. It is the responsibility of the higher echelons of Railway Administration to create confidence among front line supervisors and officers that, so long as they act in good faith and are not high handed or vindictive, they will be backed in ensuring discipline and proper work-standards. Equally, Government also must act in such a way that the hands of Administration and its officers and supervisors are not weakened by extraneous political pressures.	Necessary instructions were issued vide Board's letter No. E(O)III-81 AE3/281 dated 3-2-1982.
8	Redressing grievances should be treated by	Noted.

	the administration not as a welfare activity but as extending to the employee his rightful due and the necessary sense of urgency brought to bear on this activity.	
9	The Railway Board must give serious thought Person question of adequately personnel Branch so that each manning the given his rightful due within a reasonable time before it shows up as a grievance.	The proposal for provision of additional start was of decided to introduce considered, but it had computers gradually in the microprocessors, counts Branches to streamline their working. These are being provided gradually.
10	To remedy the situation created by sanction of awards concerning pay of staff which of retrospective effect, all awards should have prospective effect. In case of an award with retrospective effect, Government should indicate the lump-sum payments which should be made to staff, thus obviating the need to go into old records and detailed calculations.	The question of lump-sum payment to cover back the depends on each Award given from time to time legal aspects involved from the point of view of settlement of the individual's claims. In-so-far as claims with regard to pay and allowances are concerned, the procedure as adopted for all Government employees has to be followed for the railway employees also. However, in respect of certain items exclusively applicable to railway employees, efforts are made to settle such claims by payment of lump-sum, after

		necessary negotiations with the Labour Federations. Classified as Not accepted.
11	Measures to decentralise personnel functions to stations with a large strength of railway employees and major sheds should be adopted by zonal railways on the lines being tried out by the Southern Railway	Some of the personnel functions like maintenance of leave accounts, issue of Passes/PTOs etc. had been decentralized and entrusted to senior subordinates.
12	Greater attention should be devoted to welfare in the real sense of the term and not confuse it with normal grievance redressal function of the administration.	Accepted. Necessary instructions issued under Board's letter No E(W)/79/WE1-20 dated 6-4-1984 to Zonal Railways and Production Units.
13	Rational determination of the optimum workload of welfare inspectors should be undertaken.	Same as indicated against Item 12 above.
14	i) The Railways should consider expanding schooling facilities for employee's children greatly. Large schools with residential facilities should be established in cooperation with the Central Schools Organisation, at a fairly	The existing policy of the Ministry of Railways was already in consonance with this recommendation. Ministry of Railways had also called for recommendations from railways for setting up of more central schools.

	large number of suitable locations, distributed all over the country.	
15	i) It is important to see that no accident is liable to occur due to people not fully qualified being given posts, which are concerned with the safety of the public. ii) While special provisions for promotion of Scheduled Castes/Scheduled Tribes employees to safety categories, take some care of the efficiency of the promotees, they do not appear to consider the effect of such promotions on persons who have been superseded, and feel frustrated and disheartened. The depth and extent of frustration caused and its ill-effects on safety of railway working should be studied further.	Necessary instructions were issued under Board's letter No.E(NG)I-85-PM1-14(RAEC-78) dated 13-111985 For promotion in safety categories the SC/ST employees are not given any relaxation in selection Further, there are now orders that before a person can be promoted to a higher grade of a safety category, he must have put in 2 years' service in his existing grade.
16	Psycho-technical testing should for the present, be used in the spirit of counselling procedure to have the employees to	Psycho Technical test for in-service employees was being used in the spirit of counselling procedure and the

	improve their performance.	recommendation was treated as implemented.
17	All staff initially recruited in Class-IV category, who, by promotion may occupy positions vital for safety in train operation, should also be brought within the scope of psycho-technical testing right at the initial recruitment stage.	This was already being done.
18	Directorate of Psycho-technical Research should be set up in RDSO which would pursue the various areas of testing of staff and research in Applied Psychology having relevance to safety in train operation.	Not accepted. There is already a separate Psycho- Technical Cell in RDSO under Director Traffic Research, headed by a Joint Director (Psycho.). A separate Directorate of Psycho-technical Research is not justified. The promotional prospects of personnel are reviewed from time to time. Recently, this recommendation has been treated as implemented as it is now headed by an Executive Director/ Psycho).
19	The Directorate of Psycho-technical research should have greater interaction with the departments of applied psychology	This was being done and recommendation stands implemented.

	in Universities and other institutions	
20	In structuring the proposed Directorate of Psycho-technical Research in the RDSO, the inadequacies of the present cell and the guaranteeing of reasonable prospects for personnel in this Directorate, commensurate with those obtaining elsewhere, be kept in view.	Same as indicated against Item 18 above.
21	Arrangements must be made to streamline the recruitment procedures so as to make available candidates as soon as vacancies arise.	The time lag between arising of a vacancy and actual recruitment against the vacancy was being reduced at that time.
22	Direct recruitment to the category of fireman grade 'A' should be revived with immediate effect.	Direct recruitment is permissible in the grade of Firemen 'A' if the departmental competitive examination fails to provide adequate no. of qualified staff. Any change in this regard is likely to be resented to by the organised labour. However, the mode of recruitment to the category of Fireman 'A', Diesel Assistant and Assistant Driver (Elect.) was under consideration when the recommendation was treated as

		implemented/closed.
23	(i) The scheme of training apprentices in railway workshops should be revived forthwith. (ii) Fifty per cent of the vacancies in the skilled cadres in workshops should be filled from trained apprentices. (iii) The remaining 50 per cent vacancies in the skilled cadres should be filled from amongst railway men in lower grades with minimum educational qualifications of 8th class. They should receive intensive training for an appropriate period and be subjected to a suitable trade test before being absorbed in skilled categories.	(i) Training of apprentices under the apprentices Act had since been revived from September - 1981 & instructions issued. (ii) There is already provision for filling up 25% of the vacancies in the skilled cadre from out of trained Apprentices and another 25% by promotion of staff in the unskilled and semiskilled categories possessing qualification as for Act Apprentices. (iii) Not accepted.
24	In order to meet the larger requirements of electrical signal maintainers in Grade I:- (i) 50% vacancies in Grade-I should be filled by direct recruitment from graduates in Physics and Mathematics or diploma holders in	(i) & (ii), Vacancies of Electrical Signal Maintainers Grade I (Scale Rs.380-560) is now filled exclusively by promotion. There is provision for direct recruitment in lower grade of Rs.330-480 as well as in the next

	Electrical/Electronics Engineering followed by one year training. The remaining 50% should be filled up by promotion. (ii) In Grade II, all vacancies should be filled by promotion from Grade-III. (iii) In Grade III, the existing practice of filling 50% by direct recruitment should continue.	higher Inspectorial grade Rs.425700. Direct recruitment to Grade I Maintainers should not be feasible because of objection from the Recognized Unions and in view of the already existing provision for direct recruitment in lower grades. (iii): The practice of filling up 50% of the recruitment of Electrical Signal Maintainers Grade III by direct recruitment was continuing. Hence, treated as implemented.
25	Direct recruitment for mechanical signal maintainers Grade III should be given up, as this category is being fast displaced by electrical signal maintainers.	Noted. However, where there is need to recruit mechanical signal maintainers, Railways have been allowed to resort to recruitment, of mechanical signal maintainers.
26	(1) Signal inspectors should maintain, in (addition to signalling, common telecommunication equipment in their Jurisdiction after some initial training, Telecommunication inspectors should be entrusted with specialised communication installations like microwave, VHF and	Not accepted. Signal Inspectors are basically to maintain signalling equipments only. With the growing sophistication of communication equipment the responsibility of maintaining the communication equipment cannot be entrusted to signal Inspectors

	other wireless equipment and large telephone exchanges.	
	(11) Lateral recruitment in the cadres of (H) signalling and telecommunication inspectors should take into account a minimum of three grades of promotion, for each level of recruitment.	This is already the case.
	(III) The minimum educational qualification for signal and telecommunication inspectors Grade III (extent 40 to 50 per cent) should be a diploma in electronics/telecommunication engineering and for inspectors in intermediate Grade II (extent 25 per cent) it should be a degree in engineering. electronics/telecommunication	(i) The qualification for SI Grade III/TCI Grade II had been made as Diploma/BSc (Physics) and for ST Grade II/TCI Grade Il as graduate in Engg./M.S.C. (Physics).
	(iv) The requirements of signal inspectors and telecommunication inspectors for recruitment purposes should be combined.	(iv) The 1st part of this recommendation was not accepted due to the difference in qualification prescribed for Signal Inspector and Telecommunication

	Vacancies should take into account, both permanent and temporary cadres Including the anticipated requirements for works, deputation to RITES, RDSO and countries abroad. (v) All the Railway Service Commissions should synchronise their timetable for recruitment of apprentices signal and telecommunication inspectors in the initial and intermediate grades.	Inspectors. Suggestion in the 2 part had been noted. (v) Training of S&T Inspectors is organised by IRISET which intimates the training programme to Railways. This should enable Railways to plan recruitment through RRBs in time.

27	The field of selection of welfare inspectors should be enlarged to cover other departments also; persons with the required aptitude and qualifications in social work should be inducted into the welfare organisation and trained.	Category of Welfare Inspectors is already open to Departments other than clerical categories of personnel branch & persons with aptitude and qualification in social work have opportunities to Join this cadre.
28	In the lowest recruitment grades in Class IV category, including casual labour, only persons with minimum educational qualification should be recruited	Recommendation accepted in respect of direct recruitment of Group 'D' posts, including 'fresh faces as casual labour or substitutes, in future with suitable arrangements for the transition period. As over a period of time, the individual Railway have laid down minimum educational qualifications for some departments, the recommendation was treated as implemented.
29	Officers' cadre planning must be taken up in all seriousness to mitigate the acute scarcity of Class 1 (Category A) officers and to correct the imbalances which have occurred in different departments and in the divisions.	Accepted. Cadre Planning had been accepted by the Sikri Committee Part-II Conid Government and based on the recommendations of the Pay Commission, periodical reviews were conducted. Such a review had been completed, approved and implemented in respect of all the organised

		services except for RPF, which was under the consideration of the Government. The shortage of directly recruited Class I officers was being overcome with the increased intake.
30	Ways and means should be found of injecting adequately qualified engineers at different levels in the workshops, production units and open line.	While posting officers at different levels in the Workshops, Production Units and Open Line, the performance and aptitude is taken into consideration However, it will be kept in view in future also.
31	All factors which stand in the way of full utilisation of the available training capacity should be identified and remedied at the earliest.	Accepted. Closed in the light of action taken on the similar recommendations No. 59 and 60 made in Part-1 of the Report.
32	The subject of training of staff and officers should be placed under the charge of a senior officer of the Personnel Department in the Headquarters of each Zonal Railway.	Necessary instructions had been issued under Board's letter No. E(Trg.)81(21)/17 dated -1-1982
33	Before the trainees proceed on training courses, advance TA should be paid to them for the whole period of their course.	Accepted. In March, 1979, all the Railways were advised by IRISET that trainees should be granted full advance of TA before they go to IRISET, Secunderabad for refresher course

34	Adequate capacity for the refresher training of signal inspectors should be generated and utilisation thereof also ensured in greater measure.	Instructions issued and keeping in view its continuing process, the recommendation was treated as implemented
35	Training of signal artisan staff and promotional and other special courses should be decentralised and conducted in the zonal training schools where teaching could be done in the local language.	Accepted. Regarding teaching in the Zonal training schools in the local language, the same shall be done subject to instructors and class notes being available for teaching in local language on signalling and telecommunication. However, keeping in view its continuing process, the recommendation had been treated as implemented.
36	Feedback on failures of signalling and interlocking gear and reports of accident enquiries, where signalling was held to be a cause, should be sent to the signal training schools and institutes regularly.	Instructions were Issued under Board's letter No.86/W3/SG/RAEC/Pt.11/36 dated 15-5-86. Implementation confirmed by Railways.
37	The signal and zonal training schools/institutes should be fully equipped with models and equipment. Provision therefore should be made in the project estimates of all new installations.	The S&T Zonal training schools/institutes were being equipped with the models/Equipment progressively subject to the constraints of resources when it was treated as implemented in view

		of its continuous process.
38	Regular training courses should be conducted for loco maintenance staff.	Accepted. Instructions were issued under Board's letters No. E(MPP)/85/9/6 dated 3-2-1986.
39	The policy of selection of diesel and electric drivers should provide avenues for drafting surplus staff from the steam side and direct recruitment from the open market. A minimum standard of education may be laid down for the selection of diesel and electric drivers from the steam side as well as for direct recruits. Selected staff should be put through an intensive training course in the Diesel/Electric training schools.	Instructions issued under Board's letters No. E(NG)III 75/RC1/69 dated 19-8-1981 and E(NG)II-80-RC1/144 dated 17-9-1982. Minimum standards for selection of diesel and electric drivers had already been laid down which were considered adequate. In the light of instructions issued under letters indicated against Recommendation 39 (1) above, this recommendation was also treated as implemented. This was already in vogue.
40	Training in signalling matters covering	Accepted. Instructions had been issued to

	specially signal aspects and failures thereof, should form a part of syllabi for refresher training to drivers. Lectures, covering ill effects of drugs, liquors and intoxicants on the reflexes of a person, especially drivers and other running staff, should also form a part of syllabi	Zonal Railways under Board's letter No. E(Trg.)81(21)/7 dated 20-5-1981. All the Railways had confirmed that the above instructions were being followed.
41	All staff in the carriage and wagon department on first promotion to semi-skilled, skilled and highly-skilled grades should be given intensive training for an appropriate period before they are placed in their new positions (11) Safaiwalas of the carriage and wagon department who have been promoted into semi-skilled/skilled grades should be given special intensive courses at the earliest. The course content should take into account the educational background of such staff. Refresher and vocational training courses	41 (1) & (): Accepted in principle subject to ban/economy instructions in force from time to time and the availability of funds for: (a) Creation of adequate trainee posts, and (b) Creation of a training capacity adequate for this purpose. However, instructions issued under Board's letter No.E(NG)1/82/PM-1/94 dated 19-5-1986 and recommendation treated as implemented. (iii): In the light of various instructions

	must be planned for train examiners and other artisan staff at regular intervals. It should be ensured that the staff are regularly spared for these	issued under Board's letters No.E(Trg.)83(21)11 dated 9-8-1984, E(Trg)83(21)9 dated 23-2-1984, 12-7-1985 and 84/MPP/6 dated 20-11-1984, the recommendation was treated as implemented.
42	Train Examiners should be regularly sent for training at the Integral Coach Factory, Perambur	Accepted. Necessary instructions had been issued to Railways under Board's letter No.E(Trg.)83(21)/11 dated 9-8-1984.
43	Artisan staff in workshops should be given regular refresher and vocational training. There should be a proper system for monitoring their training. Such staff should not suffer any monetary loss while they are away on training.	Instructions had been issued under Board's letters No.E(Trg.)83(21)/9 dated 23-2-1984 and 12-7-1985 and recommendation treated as implemented.
44	Regular training courses, including refresher training should be given to operators and maintenance staff employed on Ultrasonic Rail Flaw Detectors.	This was already being done for Operators at a centralised place. Maintenance of equipment was arranged in signal workshops and this aspect was not included in training syllabus.
45	Welfare Inspectors should be given adequate and appropriate training to enable them to sake up effectively the welfare	Instructions regarding adequate and appropriate training to Welfare Inspectors had been issued to all Railways under

	activities of staff.	Board's letter No.E(W)79WE1-20 dated 5-5-1982.
46	Persons of high Caliber having aptitude for teaching should be posted as instructors in the schools/institutes of training. Such persons should undergo instructors training course before taking over charge.	Adequate instructions were existing. However, these were No.E(Tig.)/80(21)/9 dated 20-9-1982. re-iterated under Board's letter no. E(Trg.)/80(21)/9 dated 20-9-1982
47	Instructors in training schools should be only in the highest grades of supervisory staff, namely, Rs.840-1040 and Rs.840-1200.	Not accepted - The instructors are provided in various grades it is not feasible to provide instructors in training school only in the highest grade. At present some posts of instructors are also in Gazetted cadre (Fourth Pay Commission had also not recommended placement of instructors in scale Rs.2375-3500)
48	Heads of the Zonal Training Schools should be selected from one of the five major departments concerned with safety in train operation. They should ordinarily have a tenure of not less than 3 years.	Existing arrangements were satisfactory and no changes were considered necessary.
49	The Railway Board should find ways and means of ensuring that staff who fail in refresher training course, are not employed	Instructions had been issued under Board's letter No.E(MPP)85/9/4 dated 23/31 12-1985.

	on train passing duties till they pass such a course.	
50	Before taking over charge, a Class II officer should be given adequate training.	Not accepted as far as training before posting in class II is concerned. Training is given either before or after taking over charge. It is not always possible to give them training before taking over charge.
51	The required number of trainee reserve posts for running staff as well as staff directly connected with safe working of trains should be created without any further delay and positions filled up at the earliest. It should also be ensured that staff connected with safe working of trains are sent for refresher training at the prescribed intervals.	Instructions were issued under Board's letter No.E(G)86EC2-22 dated 18-5 1987 and in view of its continuous process, the recommendation had been treated as implemented.
52	Deputing of officers to seminars and short term courses should be left to the General Manager who should be given full powers in this matter.	Instructions had been issued under Board's letter No.E(Trg.)83(21)/26 dated 4-3-1985.
53(i)	The Faculty at the Railway Staff College, Vadodara, should be strengthened in the major disciplines.	In January, 1989 M.S. Directorate had advised that: Recently, as a part of the cadre review and with a view to

		strengthening the faculty of Railway Staff College, Vadodara, approval of the Cabinet has been obtained for upgrading 10 J.A Grade posts of Professors in various disciplines. Upgradations were in the process of implementation. Sanction for 8 upgradations had been issued and remaining 2 were expedited to be issued in near future when the recommendation was treated as implemented.
53(ii)	Major disciplines should be provided with technical or research assistants to help the professors in developing studies and research programmes.	Not accepted as it will need creation of additional posts. However, matter had been examined in length and ultimately Board had decided to accept this item on 17-7-1989.
53(iii)	There is need to revise the scale of honorarium for visiting lecturers.	The honorarium for visiting lecturers were revised w.e.f 29-7-1978. Instructions in this regard were issued under Board's letter No.E(G)78 HO1-20 dated 29-7-1978.
54	Some urgent steps will have to be taken to	Accepted. Steps had already been taken to

	modify the promotion policy to mitigate the more glaring aspects of discontent amongst staff.	provide adequate number of posts in higher grades in order to provide an avenue of promotion.
55	Essential categories of staff should be allotted quarters on priority near the place of work.	This is an existing practice.
56(i)	Construction of new staff quarters should be taken up for specific categories of staff like drivers, guards, firemen, assistant station masters etc. to improve their position of housing	Accepted. Additional quarters are constructed for essential staff, every year, on a programmed basis, and amongst the essential staff, preference is given to the running staff.
56(ii)	The entitlement of Railway accommodation to drivers, guards and such other essential categories of staff should be reviewed so as to enable them to take proper rest.	In the matter of provision of quarters preference is given to the "essential running staff such as drivers, guards, firemen etc. Instructions exist that 50% of the total annual allotment for building the staff quarters should be utilised for the construction of the quarters for "essential running staff. Entitlement of a particular type of accommodation is determined by the pay range of the staff concerned. For determining the entitlement of accommodation to "essential running staff

		like drivers, guards, firemen etc. pay is taken as pay plus running allowance to the extent of 30% of the pay in the case of those who are in the revised scales of pay. This gives advantage to these essential categories of staff for making them eligible for higher type of accommodation in comparison to other categories of staff drawing identical scales of pay. In view of this, these measures will make essential categories of running staff eligible for better type of accommodation and also earlier than that of the non-essential categories. Hence treated as Implemented.
56(iii)	Railway staff at divisional and headquarters of zonal railways, workshops, etc., should be encouraged to built their own houses to ease the pressure on railway accommodation. Housing Co-operatives amongst Railway workers should be	Railway employees are already entitled to the incentives admissible to the Central Government employees in the form of advances for purchase of land and construction of houses from Government funds. They are also eligible to get loans

	encouraged, and incentives given by way of easy loans and allotment of spare railway land.	from Life Insurance Corporation, Banks, Housing Boards etc. Any liberalization made in this respect for Central Government employees automatically becomes available to Railway employees. Any additional concession to Railway employees from Railway Administration will have wide repercussions. However, surplus railway land can be relinquished to the Cooperative Housing Societies after obtaining clearance from the respective State Govt. and with the approval of Railway Board, on payment of market rate prevailing at the time of transfer. Later, detailed orders on this subject had been issued to Railways in order to encourage Railway staff to build their own houses to ease pressure on Railway accommodation, Instructions were issued under Board's letter no.83/E(Cooperative)/26/1 dated 5.5.1983.
57	Leave Reserve percentages for different categories of staff should be reviewed in	This is a continuous process and the position of L.R. for various categories is

	the light of present leave entitlements of staff.	reviewed from time to time on the basis of requirements.
58(i)	Running rooms should be provided with Individual cubicles in which staff can take rest undisturbed.	58 (i): In the interest of ventilation, natural light and economy, it is not possible to provide individual cubicles in the existing running rooms However, wherever feasible, steps will be taken to modify them. to accommodate four to six beds and also to provide this type of accommodation while constructing new running rooms.
(ii)	Provision of basic necessities like clean linen, mosquito nets, adequate water supply, electricity, etc., should be arranged and sanitary conditions improved.	58 (ii) to (v): Accepted. Necessary instructions had been issued under Board's letters No.80/Chg-11/32/2 dated 4-7-83, 2-2 85, 25-3-85, 19-6-85 and letter No.83TG-111/652 dated13-6-1983.
(iii)	Ways and means should be devised by Railway Administrations to insulate running rooms against misuse by outsiders.	
(iv)	Running rooms should be located in close proximity to the place of duty.	
	Trained cooks should be provided in	

(v)	running rooms to meet the needs of staff fully.	58.vi. Not accepted. The canteens will become a source of nuisance by attracting crowds from other categories in the vicinity, affecting the rest being availed of by running staff. Such canteens may not also be popular with the running staff as they will not be cheap and may not serve individual tastes as in the existing arrangements.
(vi)	Railways should also consider establishing regular canteens in the larger running rooms.	
59(i)	Crew rest vans should be provided with cushioned berths, lighting, fans, water, cooking facilities, bathrooms, etc.	Instructions issued under Board's letter No.80/M(C)/165/9 Pt. dated 6-5-1986. Later, closed in the light of diminishing trend of these crew rest vans with the phasing out of steam traction.
(ii)	Development of proper type of crew rest van in place of the existing 4-wheeler should be considered.	Not accepted. The usage of crew rest vans has got drastically reduced, especially with the implementation of 10-hour Duty Roster on Railways. The demand for these vans would further be diminishing with the phasing out of steam traction. It is therefore, not considered necessary to incur expenditure on the development of crew

		rest vans.
60	Assessment of the fatigue level in running/station staff in performing duty at night vis à vis day should be studied by the RDSO. This should form a rational basis for determining the limit of duty hours during night time.	Study made by RDSO in September, 1984. However, the then ED(Safety) had on 2-11-1986 considered that this recommendation stands implemented.
61	We jurisdiction and workload of Permanent Way Inspectors should be reviewed.	The observations of the RAEC have been noted. The review of jurisdiction of PWI is a continuous process and depending on the workload, the Railways always initiate such proposal.
62	1. Permanent way inspectors must be Permed of the stores charge under them. 2. Permanent way stores depots each under charge of a store keeper, in appropriate grade, should be set er, one for each sub-division on the open line	Both these recommendations were classified as Partially accepted with the setting up of Centralised partially accepted with the always and PWIs being partially relieved of their stores duties, treated as implemented.
63	Adequate assistance should be given to Way Inspectors to look after establishment matters properly.	The CE Directorate advised that posts of clerks in that post's workload of PWI's offices has been reduced by creation of

		centralised P. Way Depots, Presumably, this gives the PWI's clerks more time for Establishment work Hence, this was treated as implemented.
64	Yardstick should be laid down for the workload of Inspectors of Works on the basis of which their jurisdiction should be rationalised.	The workload of Inspectors of Works is reviewed from time to time and adjustments made wherever necessary. Moreover, additional staff are posted to carry out special works constituting large scale additions or replacement of existing assets. This is done to ensure that the work load on the Inspectors is not excessive.
65	The workload of Assistant Engineers on the open line should be studied and their jurisdictions rationalized.	Keeping in view the reduction in work content due to introduction of mechanised track maintenance, measured shovel packing, long welded rails, etc., and the fact that the upgradation of posts from Group C to Group 'B' has improved the strength of AENs by over 47%, the workload on AENS has already come down and there is no need to alter the norms already determined after Efficiency Bureau's study. Hence the recommendation was classified

		as not accepted.
66(i) **(ii)**	The creation of a traction cadre consisting of mechanical and electrical engineers, who would be responsible for the maintenance and running of diesel and electric locomotives, should be considered. The workshop cadre should be separate from the traction cadre.	66(1) & (ii): The matter had been examined. It is Sikri Committee Part-II Contd. considered that the existing system is satisfactory and no change is necessary.
67	Encouragement should be given to all officers and supervisors to take up membership of technical and professional institutes and societies in this country as well as abroad, Membership fee and subscription paid by all officers to one national and one international Institute/ society and that paid by senior supervisors to one national institute/society should be reimbursed.	Necessary instructions had been issued under Board's letter No E(G)83FF-1/4 dated 9-12-85, 20-1-86, 29-4 88, 15-2-89 and No.E(G)90FE1-1 dated 7-1-1991, 8-5-91 and 28-1-1993.0
68	Encouragement should be given to officers and staff to acquire higher qualifications by providing them with facilities and granting	Partially accepted. For non-Gazetted staff, there is already a system of giving incentives like advance increments etc. to

	Incentives.	staff who acquire higher qualification. For officers and staff study leave facility also exists. The facilities were already available at the time when the RAEC was preparing its report. In view of this the item was considered as implemented.
69	Rail section 60 kg per metre should be laid not only on sections carrying traffic more than 20 gross million tonnes but also on other routes where the density of traffic may not have reached that level but may be rapidly increasing.	Due to limited availability of 60 kg. rails, their higher cost, as also the need to have a different, heavier, and more expensive type of sleeper to suit 60 kg rails, it is not considered advisable for the time-being to adopt 60 kg rails on routes having a traffic of less than 20 GMT per annum.
70	Use of rail section 41.61 kg per metre (90lbs per yard) on selected metre gauge sections is a step in the right direction. This together with rail section 37.13 kg per metre (75 lbs per yard) should progressively replace 29.76 kg per metre (60 Ib per yard) and lighter rail sections on metre gauge routes.	Track standards had been issued accordingly. Implemented.
71	The standard of track in yards should be upgraded in keeping with the standard	Comprehensive instructions had been issued to the Railways under Board's letter

	prevailing elsewhere on the running lines. In doing so priority should be given to tracks in important yards which handle large volumes of traffic	No.82/W6/RRC/15/22 dated 25-2-1983.
72	The requirement of funds for track renewals should be viewed by Government as an essential input for safety and should get commensurate priority. With escalating cost of renewals, unless much larger financial allocations are made, with immediate effect, the backlog will get totally out of hand.	Every effort was being made to allot maximum possible funds for track renewals, hence, treated as implemented.
73	The condition of track from Guwahati to Furkating on the Northeast Frontier Railway is Furkating on satisfactory even from safety standards. Track renewals on this and other similarly distressed sections should be taken up on an urgent basis and completed within the shortest possible time.	As far as Guwahati-Furkating section is concerned out of 329 Kms, rail renewals were likely toned, completed for the entire line except for 9 Kms, and through sleeper renewal of 55 kms, length only was to be left upto the end of March 1986. The balance track renewal works had also been programmed for completion during 1986-87 when the recommendation was treated as implemented.
74	The Railway Board should draw up a time	To ensure safety, new or heavier type of

	bound programme for upgrading the track on branch lines, which should be completed prior to the introduction of heavier axle locomotives on these lines.	rolling stock is permitted to run only after careful examination of track and bridges and with the prior approval of the Commissioner of Railway Safety. Speed restrictions are imposed if warranted. Track renewals (which also include upgradation of track structure where necessary) are taken up on a programmed basis, taking into account the age and condition of track on various sections and availability of funds. This is a continuing process, and it would not be possible to draw up any time-bound programme for this purpose.
75	Guidelines be laid down regarding the percentage of un-serviceable sleepers that can be permitted in track and the extent of speed restrictions which should be imposed with their progressive increase.	The imposition of the speed restrictions is dependent on a number of factors such as physical condition of rails, sleepers, ballast, fittings, the type of formation, the standard of maintenance, track geometry, grade and curvature of the track, extent of cant deficiency etc. As such, it is not possible to link speed restriction with the extent of unserviceable sleepers only. Further, the assessment regarding percentage of

		unserviceable sleepers is bound to vary from person to person, as it is not possible to be very precise about it. It is not therefore, considered desirable or practicable to lay down guidelines linking percentage of unserviceable sleepers with speed restrictions.
76	An all-India Organization under a separate General Manager should be set up for planning and execution of track renewals on the Railways.	This had been considered at the Board's level and RAEC's recommendation for planning and execution of track renewals under an All India Organisation had not been accepted. Instead of a separate G.M, the post of Director Track had been created in Board's office.
77	The question of pricing of rails which is seriously affecting supplies to the Railways must be looked into by Government at the highest level. Conditions should be created so that the Steel Plants meet the requirements of the Railways in full.	The Rail prices are fixed by JPC and in the last 10 years the rail prices have gone up to seven times from Rs.940/- per tonne to Rs.6780/- per tonne. The increase had been abnormal. The production of rails at Steel Plant had also gone upto 2.61 lakh tonnes in 1984-85. SAIL had provided supply of 3.7 lakh tonnes in 1985-86. Therefore no action appears necessary on the

		recommendation to fix a reasonable price of rails to increase the production at the Steel plant as the rail prices were already high.
78	Released rails should be re-profiled before being re-laid in track. As a first step in this direction, 44.61 kg. per metre (90 lbs./yard) rails released from broad gauge track must be re-profiled before these are re-laid in metre gauge track.	Released rails should be re-profiled before being relayed in track etc. A proposal for procurement of two rail re-profiling plants at a cost of approximately Rs.2.5 crores had been approved through budget for 1984-85. The tenders invited had been examined and Minutes of Tender Committee accepted by the Board. The order shall be placed on the firm on clearance of this proposal for foreign exchange. The plants shall go in production by Middle of 1987. On this advice from C.E. Directorate, the recommendation was treated as implemented.
79	For monitoring of the rail wear, use should be made of the system of automatic rail wear inspection, with a self-propelled vehicle.	Not accepted.
80	Arrangements for supply of wear-resistant	In 1985-86, Bhilai Steel Plant was

	rails by steel plants must be finalized early to meet the recurring requirements of the Railways.	producing 20,000 M.T of (90 UTS) rails when this recommendation was treated as implemented
81	Development and manufacture of thick web rails should be undertaken on a priority basis.	Trials with thick web tongue rails were being carried out by the Railways and the results monitored by RDSO when the recommendation was treated as Implemented in March 1986.
82	Production capacity for concrete sleepers, on both the broad and metre gauges, must be developed speedily for a long-term remedy of the problem of unserviceable sleepers.	31 factories including two departmental units and one public sector undertaking unit having an overall capacity of producing 18 lakhs BG sleepers per year were at various stages of production. The production during 82-83 was over 10 lakh sleepers and during 83-84 over 12 lakh sleepers were proposed to be produced. As regards concrete sleepers on MG, setting up of two departmental units, one each for Southern and Western Railways, had been approved by the Board through Budget for 1984-85. A memorandum for setting up 3 more units was also being processed for Board's approval when the recommendation was

		treated as implemented in Oct, 1984.
83	Necessary organisation must now be provided in the Civil Engineering Department to sustain the effort for procurement of permanent way fittings.	Procurement of permanent way fittings was transferred temporarily for one year at first in September, 1979, to Civil Engg. Departments on the Railways. This arrangement was being continued, and was working satisfactorily.
84	Ordering of permanent way materials required for track renewals and financial commitments Therefor should be ensured well in advance, so that supplies are received in time to carry out the work during the fiscal year itself.	Accepted. As a matter of fact action to procure materials for track renewal works is taken in advance every year after the volume of work and the availability of funds for the next year are known. Shortages are, however, encountered due to shortage/delay in supply of materials and constraint of capacity within the country. To overcome this, to some extent, import of track materials to a limited extent is also resorted to. However, as decided by the then DCE and D(Safety) in their meeting held on 19-8-1985, this recommendation stands implemented.
85	The Railways must make full use of the	This was already the policy of Railways.

	available concrete sleepers for track circuiting works. It should also be ensured that concrete sleepers are laid in continuous length to avoid discontinuity in track structure.	Concrete sleepers were being used for track circuiting and were laid in continuous lengths to the maximum extent possible.
86(i) **(ii)**	The ballasting programme on the Railways must be speeded up to meet the requirements for recoupment of ballast on the basis of accepted norms. Adequate funds for this purpose should be made available. The functioning of ballast trains should be streamlined by providing adequate traffic blocks and suitable motive power.	(1) & (ii) Noted. Every effort was being made to speed up ballasting and to streamline the working of the ballast train. Instructions had already been issued. The problem, however, was of getting adequate traffic blocks om high density sections. DEB was already looking inte the possibilities of blocks of larger duration. This was a continuous process. However, the Committee's observations had been accepted & already implemented in spirit.
87	The serious problem created by miscreant activity on certain sections of the South	Accepted. Necessary instructions had been issued under Board's letter No.86/Sec.

	Eastern Railway in removing stone ballast from track and disturbing the packing under the sleepers, should be taken up by the Railway Administration with the State Government at the highest level.	(Cr.)/45/13 dated 18 6-1986.
88(i) **(ii)**	The strength of permanent way gangs should be correlated to the maintenance practices in vogue and the track structure actually obtaining. Arbitrary cuts in the hope of Introducing modern methods of track maintenance/track structure will not be rational. Finalisation of the gang strength formula should not be delayed any longer and the strength of gangs must be rationalised on its basis within the shortest possible time.	(i) & (ii): The gang strength formula by the special committee had been finalised and instructions issue to the Zonal Railways under Board's letter No.E(NG)I 77/CL/46 E.Rly dated 12-1-1983 for implementation The formula takes into account the different trac structure and different maintenance practices e reduction factors had been specified for SWP or for welded rail structure and maintenance by machines.
89(i)	Service tolerances, indicating the limits beyond which track will need attention, must be laid down for various speeds and categories of tracks including branch and unimportant lines. These must be rigorously implemented through an	Track is monitored presently by visual inspection, riding in vehicles and by track recording cam oscillograph cars and Hallde recorders. It is m possible to lay down service tolerances for each category of track and speed with the available means of

	effective system of monitoring.	track monitoring and the present state knowledge of rail-wheel inter-action of different type of vehicles running at varying speeds on different types of track.
(ii)	The RDSO should examine the question of how much departure from the 'service' tolerances will be permissible without jeopardising safety.	A large amount of R & D Work v necessary before this recommendation can accepted. (Classified as not accepted). The matter had been examined carefully consultation with the RDSO which was at that time conducting study for developing rational service tolerances. Laying down safety tolerances was w much more complex and at that stage it had not be found possible to lay down such tolerances.
90	The Railways must be equipped with an adequate number of portable accelerometers to supplement monitoring of track by track recording cars.	In addition to 8 portable accelerometers already available with the Railways, tenders had already been opened for 15 more accelerometers when the recommendation was treated as implemented.
91	The RDSO should lay down guidelines for	The revised system of classification of

	working out the track geometry rating, on the basis of the parameters of track which are monitored, for assessing the state of track maintenance.	track geometry based on the concept of standard deviation had been formulated on the basis of 59 Track Standard Committee's recommendations.
92	Guidelines should be laid down regarding tolerances for gauge alignment, sleeper spacing, cross-levels, unevenness, etc. to assist the permanent way staff to impose and progressively raise speed limits at engineering works.	Speed restrictions in such cases are primarily due to lack of consolidation and packing under the newly-laid track Specifying service tolerances under these circumstances would not serve any useful purpose. Speed restrictions are removed progressively as the track gets consolidated with a series of successive packing and due to the passage of traffic.
93	Speed restrictions for engineering works should be planned in advance and within the overall limitations of the time provided for engineering works in the time table. These should become operative from a pre determined hour.	Accepted. This was in fact the practice. However, the existing instructions were reiterated to the Railways
94(i)	Engineering restriction boards must be displayed at the maximum braking distance of trains operating on the section.	(i)to (iii): Engineering restriction boards are used for speed restrictions of temporary or permanent nature. Detailed instructions regarding the design and display of such

(ii)	It must be ensured that the speed restriction boards are displayed properly and those which required to be lit at night are done so effectively.	indicator boards exist in the Indian Railways Way & Works Manual. These are quite satisfactory. Temporary engineering restriction boards remain lit at night but permanent restrictions boards are not lit. As
(iii)	Development of the electrically lit 'speed indicator lamps, to take the place of conventional speed restriction boards, should be undertaken for use on the Railways.	the nature and location of speed restriction is always known to the drivers and the engineering signals have a non-varying aspect and no difficulty has been experienced, the existing system of engineering signals is considered to be adequate. Hence 94(iii) was classified as not accepted.
95	Railways should make use of AWS system on track for protection of speed restrictions on sections where the AWS system is operative.	Instructions had been issued to Zonal Railways under Board's letter No.79/W3/SG/RAEC/1 dated 30-1-1986. Its implementation being of long term process, the recommendation was treated as implemented.
96	More intensive use of the track recording-cum- research car must be planned. The projects assigned to the research car should be taken up with a sense of priority so that	As per the advice received from Track Directorate, the track recording-cum-research car was already being intensively used and besides being used for research

	the benefits may flow to the field.	purposes, It was also monitoring Rajdhani routes, hence, treated as implemented.
97(i)	In major yards, track should be made available for maintenance on the basis of a pre-planned schedule.	Accepted instructions had been issued to the Railways for taking appropriate action in the matter.
(ii)	Welding of calls in track, in major yards, should be undertaken.	The welding will be done keeping in view the site condition and the provision for safety again buckling.
(iii)	Proper cleaning and maintenance of yards must be ensured so as to keep the interspaces between tracks clear and free from obstruction Drainage in yards should be improved.	Instructions for proper maintenance and cleanliness of railway yards as also for provision and maintenance of efficient drainage in the railway yards already existed in the Indian Railways Way & Works Manual addition to these, supplementary instructions were also issued by many Railways for proper maintenance and drainage of yards. However, instructions has been repeated to all the Zonal Railways impressing on them the need for maintaining the yards in good condition as also to ensure their cleanliness and proper drainage.

98(i)	Schedules for testing of rails with ultrasonic rail flaw detectors must be laid down for all types of tracks on the basis of importance of the line, traffic carried, speeds of trains, age of rails, trend of rail fractures, etc	(i)As per the published views of the M/O Railways this was being done.
(ii)	More determined and urgent steps should be taken to extend and intensify ultrasonic testing of rails in running lines	(ii) Same as indicated against (1) above.
(iii)	Adequate number of rail flaw detectors must be provided on each division of the Railways to enable regular testing of rails on running lines.	Not accepted The testing of rails is programmed and regulated from Zonal Railways Headquarters keeping in view the prescribed frequencies & priorities
(iv)	Rail found defective by ultrasonic testing must be removed from track, timely.	This is being followed.

(v)	The Railways must develop adequate facilities for repair and maintenance and periodic calibration of ultrasonic rail flaw detectors.	Adequate facilities in this regard were available on the Railways.
99	An arrangement should be provided on Ultrasonic Rail Flaw Detectors to record the flaws in rails detected during testing.	Not accepted.
100	The railways should go in for ultrasonic rail inspection cars as early as possible, with a view to quicken the pace of testing of rails in running track.	A tender for procurement of ultrasonic rail inspection car had already been opened. As approved by the Board, negotiation were also held with the tenderers In view of its long term process the recommendation was treated as implemented.
101	The RDSO should carry out studies on the relationship between defects or flaws in	Based on experience and studies, categories of flaws which call for removal of rail from

	rails and their propagation under actual traffic conditions, so as to arrive at the precise limit of defects in rails, necessitating their removal from track.	track had already been identified. Adequate studies had been carried out on the subject and no practical advantage was expected in further study, since crack propagation depends on factors not easily identifiable.
102	(i)In view of the inherent weaknesses in the thermit welding process, flash butt-welding of rails should be done to the maximum extent possible. All new thermit welded joints must be ultrasonically tested.	(i)There were 7 flash butt welding plants giving an output of approximately 1.04 lakhs joints per year. Requirement during 7 Plan assessed as 2.8 lakh/year. 2 plants had been installed during 1984-85, two were under order and three plants had been approved for inclusion in the Pink Book for 1985-86 These were being tested ultrasonically.
103	Manufacturing defects in the rails caused 21 per cent of the reported rail failures during 1977-78. Some arrangement should be made whereby every new rail put in track is subject to ultrasonic testing in advance.	Instructions already exist that the initial testing of the rails be preferably done ultrasonically at Flash-butt Welding Plants before the rails are welded. However, where this is not possible, rails are to be ultrasonically tested immediately after laying but in no case later than 3 months from the date of laying.
104(i)	The Railway Board should ensure that	(i)&(ii) Necessary instructions were issued

(ii)	Information required by the RDSO for numerical analysis of rail failures, is furnished by all Zonal Railways, timely. The R.D.S.O should ensure that the results of yearly numerical analysis of rail failures are published and circulated to zonal railways with the least delay.	to Zonal Railways under Board's letter No.80/W6/RAEC- 78/17/104 dated 29-10-1981.
105	(i) In view of the deleterious effect of flat tyres on rails in track, its permissible limit should be reviewed by the RDSO. (ii)Effective means should be developed for detection of flat tyres on rolling stock. These should, under no circumstances, be permitted on running trains.	(i)Not accepted As the present limits of flat tyre were adequate and did not call for any change. (ii)Not accepted The present system of detection was considered adequate & wheels having flats within the existing limits laid down could continue to be permitted on running trains.
106	Self-propelled access platforms must be progressively introduced to facilitate inspection and maintenance of bridges and overhead structures.	As, a self-propelled access platform had been ordered, the recommendation was treated as implemented.
107	The serious problem created by wide-spread theft of permanent way fittings from	Accepted. Action, as suggested, was already being taken for the last so many

	running lines on certain sections of the Eastern and South Eastern Railways passing through the states of Bihar and West Bengal must be taken up by the Railway Board and Railway Administrations with the State Governments at the highest level.	years.
108	The RDSO should undertake development of track fittings with a view to make their pilferage difficult.	Based on the recommendations by Track Standards Committee, pilfer proof fastening System had been evolved which was under procurement for field trials. Other than elastic fastenings on concrete sleepers, methods already exist for key fastening and dog spikes, to make them pilfer proof, but since these had to be removed for gauge adjustment etc., this practice could not be widely used.
109	The Railways must ensure that the basic necessity of a telephone is provided at the residence of all permanent way inspectors on the open lines.	Where railway telephone exchange were existing, the PWIs were invariably provided with the telephone,
110(i)	At important stations where trains stop on lines. platform lines, washable aprons	Railway had been advised under Board's letter No.82/06/RC/15/12 dated 25-2-1983

	should be provided	for necessary action to be taken for provision of washable aprons on platform lines at the important stations in a phased manner depending upon availability of funds. As per the status available in March, 1983, 143 stations had been provided with washable aprons
(ii)	Platform occupation should be planned in such a manner as to leave adequate time for the maintenance of tracks on platform lines.	
(iii)	The subject of dropping wastes from passenger carrying trains should be given serious thought. Improved arrangements need to be devised so that platform lines do not give the impression of the open-air latrines.	Necessary instructions were issued under Board's letter No.80/Chg.II/22/16 dated 14-10-1980
111(i)	Manning of accident-prone unmanned level crossings, on the basis of stipulated norms, must be left to the Railways themselves who should complete this work within the shortest possible time.	The manning of hazardous accident prone unmanned level crossings with 10000 TVU per day was being done at Railway's cost and the Zonal Railways had been advised to ensure that the work is taken up out of turn' and completed on top priority basis. In addition, 150 hazardous accident prone unmanned level crossings with 6000 TVU per day or level crossings with restricted visibility had also been identified for

		manning and the work had been programmed for completion up to 1982. In 1983 about 1600 unmanned level crossings, where buses ply, had been identified for manning, in addition to the manning of hazardous unmanned level crossings. The Programme was proposed to be implemented over a period of four years subject to availability of funds About 1000 unmanned level crossings within station limit had been identified to be provided with lifting barriers operated from cabins This programme was proposed to be implemented in a period of 4 years subject to availability of funds when the recommendation was treated as implemented.
(ii)	Once the need for manning an unmanned level crossing /upgrading a manned level crossing is established the work should be processed and completed expeditiously by the Railways, adjustment of cost etc. could be settled with the State Government(s)	Accepted Subject to availability of funds under 20% of RSWF controlled by Ministry of Railways However, in view of its continuous process, the recommendation was treated as implemented.

	later.	Accepted in principle, Later, it had not been found feasible to change the present system of dropping wastes from passenger carrying trains. Instead, decided that the provision of washable concrete aprons on platform lines & social education of passengers would continue. Instructions in this regard were also issued under Board's letter No.80/M(C)/202/19 dated 14-1-1986 Being of continuous and long term process, it was treated as implemented.
112	Census at level crossings should be conducted regularly and expeditious follow up action taken on the results thereof.	Census at level crossings is conducted periodically and depending on the availability of funds the question of manning all those level crossings, which show high density of rail, road traffic, is taken up.
113	At level crossings where opening of the gates become necessary at night also, two gatemen must be provided on 12 hours shift	Two Gatemen on 12 hours duty are provident at all such level crossing gates which are operated during night also. As

	duty Altematively, level crossings with light road traffic at night should be considered for being kept closed during that period.	per the advice made available by CE Directorate in 1986, a survey of 7000 such single manned level crossings was undertaken. Only at 2812 level crossings road traffic was predominantly during day time
114(i)	State Governments should be encouraged to utilize the Railway Safety Works Fund to the extent of actual requirements. Adjustments vis a vis actual share of each state, on the basis of extant rules of apportionment could be done on a long-term basis.	The need for taking up more and more safety works was being impressed upon the State Governments from time to time. The matter had been brought to the notice of the Chief Ministers. A revised and simplified procedure laid down by the Ministry of Finance in regard to reimbursement from Railway Safety Works Fund to State Government in respect of approved works was circulated to Railways under Board's letter No. F(X)II-81/CMT/5 dated 5.1.84
(ii)	The Railway must be free to use accumulations under the Railway Safety Works Fund for manning of unmanned level crossing/upgrading of manned level crossings and for provision of road over/under bridges Arrangements outlined	In 1971 the Railway Convention Committee in their Ist Report covering accounting matters had recommended a review of the basis on which accretions to the Railway Safety Works Fund are distributed among the State Governments.

	above may have political implications; however, in view of the large number of accidents endangering public, which continue to take place at level crossings, these should be worked out at the highest level.	A review was accordingly undertaken. Majority of the State Governments did not favour change in the existing basis and the Ministry also endorsed this view.
115	The rate of accidents at manned level crossings provided with telephones was much less than those without telephones We strongly reiterate what we had recommended in Part 1 of our Report (paras 322-328) that telephone communication must be provided at all mid-section manned level crossings within the shortest possible time.	As per the position made available by S&T Directorate 6863 Level xings had been provided telephone and another 4307 were yet to be provided when the recommendation was treated as implemented, being of continuous/long term process.
116	Speed breakers/bumps or rumble strips should be provided on approaches to all level crossings used by road vehicles. The drivers of approaching road vehicles should be pre- warned adequately of the existence of these.	Accepted. The Ministry of Transport and Shipping which was concerned had already issued instructions to State Governments. However, instructions had also been issued to the Railways that wherever speed breakers/bumps or rumble strips on approaches to level crossings have not been

		provided by the Department of Surface Transport, the same should be provided by the Railways.
117	All special, A and B class manned level crossings in mid-section should be protected by gate signals. All such level crossings in Centralised Traffic Control and Automatic Signalling territories should be given priority.	In 1985 almost all special && 'A' class gates in the mic sections had been interlocked with signals and recommendation so far as it was accepted had been taken as implemented.
118(i)	Devices in the nature of loud warning bells/hooters which are actuated by approaching trains should be provided at all manned level crossings in the mid-section Priority should be given to level crossings in sections where the incidence of accidents has been high Such devices should also be provided at unmanned level crossings frequented by road vehicles.	Not Accepted at that time some time ago, such a system was developed by CEL/Sahibabad During trials, the system was found unworkable in Indian conditions. Even after several modifications, the system did not perform satisfactorily company/ROSO has been able to develop a pile proof model.
(ii)	The ROSO should develop a warming	Same as indicated against Item 118(i)

	device for level crossings, which will function satisfactorily in the conditions obtaining on the Railways.	above.
119	The involvement of tractors in accidents at lever crossings has greatly increased in the states of Punjab, Haryana and Uttar Pradesh The railways serving these states must take up with the State Governments the question of tractor drivers being made to observe safety rules at level crossings.	Ministry of Shipping and Transport had advised 1983 that according to section 3 of the Motor Vehicle Act 1939, no person shall drive a motor vehicle in a public place unless he held an effective driving license, hence, the tractor driver is required to obtain a driving licence. They had ascertained from a number of State Governments that they had already made it obligatory for a tractor driver to obtain a driving licence. State Governments had also been requested to ensure strict compliance of the rules
120	In certain areas there is high involvement of bullock carts in accidents at level crossings. The Railways should, in consultation with the State Governments, undertake a continuous programme of educating the public in rural areas through mass media, of the hazards at level crossings and their	Instructions were issued under Board's letter No. 85 Safety 1/9/4/Item 120/ Pt dated 28.2.1986.

	responsibilities in this regard.	
121	(i) The Railways, in consultation with the i) State Governments, should examine the possibility of closing down some of the level crossings, which are located in close proximity. (ii) New unmanned level crossings should normally nor be permitted and if they have to be provided, the decision should be taken only at a high level.	(i)As advised by the C.E. Directorate, this was being pursued by the Zonal Railways and instructions were also issued by them (ii) It was also being followed by all the Railways and only in exceptional cases unmanned Level Crossings were being permitted. However, some instructions were also issued under Board's letter No.82/Safety 1/3/8 dated 31-3-1982.
122	Literate gatemen only, should be posted at manned level crossings having telephone communications.	Instructions were issued under Board's letters No. E(NG)1-8SCFP/11 dated 20-1-1986 and 3-10-1996
123	More extensive trials with automatic half barriers should be conducted on non-suburban sections, away from metropolitan cities.	Not Accepted. Such automatic half barriers are not suited for Indian conditions especially in view of slow traffic on many of the non-suburban sections away from metropolitan cities.
124	The Railway must ensure that working instructions are available at every level crossing and an assurance is taken from	Necessary instructions were issued under Boar letters No. 80/WI/AC/B dated 26.7.82 and 82/Safety(A&R)/29/2 dated 18.1.82.

	each gateman about his having understood these.	
125	For ensuring minimum basic safety of train operation as well as to guard against derailments at a station, rudimentary interlocking, must, at least, be provided at a stations on the arrow gauge	There are very few sections, which are non-interlocked. Since these stations are either on sections with one engine only' system or where very light all traffic exists or where the speed is very low provision of even rudimentary interlocking is not considered essential on such sections.
126	Guidelines should be laid down for upgrading the standards of interlocking at stations on the basis of density and speed of traffic.	Guidelines already exist for provision of the standard The of interlocking at stations on the basis of speeds of traffic. It is not considered necessary to issue any hard and fast guidelines relating to standard of interlocking with the density of traffic.
127	Maintenance work at signalling installations should be analysed and split into its various component units, separating items of routine maintenance from items of adjustment of signal and points fitting etc requiring disconnection	Since interlocking is a system of logical inter- us connection of various functions of the safety devices me provided at a station, it would not be possible to split of the various activities of maintenance as either ng requiring disconnection memo or not, at a station.
128	Only electrical signal maintainers in Grade	Not accepted. The creation of post of

	1 should be permitted to sign the Reconnection Notice in Form SST/ DN prescribed in Signal Engineering Manual The disconnection notice may be signed by an electrical signal maintainer in a lower grade.	maintainers in on signal department is already on worth of charge basis al and where sophisticated/complicated signalling assets e are in use the maintainers are already in Grade 1. al Therefore the disconnection and reconnection notices could be signed by signal maintainers for that particular station irrespective of the grade.
129	(i)All problems connected with maintenance of signalling equipment should be thoroughly examined and a practicable and realistic solution found so as to ensure the availability of adequate time for maintenance. (ii)	(i)All the Railways except Northern & Eastern had stated that they were not experiencing any problem in the implementation of this ty recommendation. Both these requested Board to issue necessary directives so that disconnection memos are accepted. A letter was accordingly issued under No.86//W3/SG/RAEC/Pt.11/129 dated 24-1-1987. (ii)The integrated traffic block maintenance will of be utilised where feasible.
130	Some minimum recovery time must be	Not Accepted. There is a recovery time

	provided in the time tables which will cover detentions to trains on account of signal failures at least on the busy sections where important trains run.	provided in er the timings of all important mail/express trains for any al unforeseen contingency and this would include e detentions on account of signal failure. Besides there is a margin to make up time by the driver by running at the maximum permissible speed as against the booked speed. This should take care of loss in punctuality of mail/express trains due to an odd case of signal failure.
131(i) **ii**	At present the emphasis is only on periodical testing of locking and overhauling lever frames, and the electrical signalling such portion including the circuitry does not All electrical signalling equipment and circuitry must be inspected and tested according to stipulated schedules. Adequate time must also a to sections to enable the signalling staff to effectively carry out inspection and testing of electrical signalling equipment	The recommendation emphasises the inspection and testing of all electrical signalling equipment and circuitry according to stipulated schedules. The Railways are already supposed to be doing that. However, periodicity for O.H. and testing of electrical Equipment is laid down in the SEM, which is obligatory for all the Railways. No further instructions are required. With the proposal for accepting disconnection memo whenever a gap

		between two trains exists being under consideration, adequate time would be available for testing and inspection of electrical signalling equipment.
132(i)	Only inspectors and maintainers who have undergone special training in sophisticated signalling equipment in the Indian Railways Institute of Signal Engineering & Telecommunication, Secunderabad, should be entrusted with the maintenance of such equipment	This was a continuous process and Railways and IRISET are taking necessary action subject to the constraints of additional staff required at IRISET which proposal was pending in Board's office
(ii)	A system of issuing competency certificates to staff, who successfully completes training in the specialised field of signalling, should be introduced. While posting staff in the field, especially on modern signalling installations, this should be taken into account.	Not Accepted. Since the staff are given intensive training in which they have to pass, the system of issue of separate competency certificate is not considered necessary.
133	The progress and the follow-up action in the matter of providing electric lighting of distant signals has been extremely tardy. The Railway Board, having taken a	This is an observation. However, as advised by the Signal Directorate in 1985 nearly 55% of Distant and Warner/Outer Semaphore Signals had been provided with

	decision, should have pursued it effectively. We stress that this work should now be completed without further Delay.	electric lighting Railways were progressively providing this feature.
134(i)	Effective steps should be taken by all the concerned departments through more frequent inspections at different levels to improve the visibility of signals at night.	This was being done. However, instructions were also issued under Board's letter No. 70/W3/SG/CLS/4 dated 3.10.86.
(ii)	The work of electric lighting of semaphore signals should progress at a faster pace.	Instructions reiterated under Board's letter No.83/W3/SG/G/4 dated 18.2.86. Being of a continuous and long-term process, it was treated as implemented.
135(i)	For improving the visibility of colour light signals:	Voltage stabilisers were being used by the Railways. 33 watts signal lamps were being used by the Railways.
(ii)	Automatic voltage stabilisers be provided at different locations of signals;	
(iii)	Higher wattage bulbs, 1.e. 33 watts instead of 25 watts should be used;	Instructions issued under Board's letter No.87/W3/SG/CLS/2 dated 9.5.88.
(iii)	Improved design of double lenses should be used; and Power supply should be drawn from OHE instead of local supply.	Instructions were issued under Board's letters No. 82/RE/250/1 dated 19.10.83 and No. 85/W3/SG/CLS/1 dated 26.6.85

136	Joint inspection of signals by signal, loco and traffic inspectors, as per schedule, should be made more effective and intensive in order to ensure proper visibility of signals by day and by night.	Instructions were Issued under Board's letter No. 70/W3/SG/CLS/4 dated 3.10.1986.
137	All semaphore distant signals should be provided with electric signal motors, and these should be made to assume automatically the signal aspects, corresponding to the position of the home signals.	As thefts of electric signal motors on most of the sections are becoming rampant, it will not always be possible to provide motors on distant signals Classified as Not accepted.
138	Colour light signalling should be provided on a few remaining single line sections with A.C traction. In doing so, advantage should be taken of the OHE power supply.	This was already an accepted policy.
139	The conversion of semaphore signals into colour light signals at stations where signal of both types are there, should be taken up on a programmed basis	This was already an accepted policy. However, conversion of semaphore signals on such junctions to colour light signals could not progress due to constraints of resources. Being of a continuous process, the recommendation was treated as implemented.
140	Route relay interlocking, which aims at	This was in keeping with the accepted

	centralising the control, must be provided at the more important junction stations.	policy and was being provided whenever the signalling gears were due for replacement. As per the position received from S&T Directorate in 1985 there were about 100 yards which need to be provided with RRI system as per the traffic requirements of that time. The total requirement was about Rs. 375 crores and was expected to take about 13 years to provide this feature. Being of long term process, the recommendation was treated as implemented.
141	Norms for failures of signalling and interlocking equipment should be laid down for judging the efficiency of the system.	It is not possible to lay down any norms for signal failures for judging the efficiency of the system as signalling equipment are prone to interference and theft. However, efficiency of the maintenance is judged by comparison with past figures of the same section per 1000 DISTUS.
142	Signal failures must be reviewed with the intention to learn more about the	Instructions had been issued under Board's letter No. 85/W3/SG/SF/2 dated

	inadequacies of the system for taking corrective measures. The practice followed on some divisions of the Western Railway where important signalling and interlocking failures are analysed and discussed in detail along with remedial measures and are circulated to staff in the field for guidance, should be followed on all the railways.	25.10.1985.
143	Signal defects or failures reported by drivers should receive prompt attention of the signal maintenance staff and remedial action taken without delay.	A suitable machinery to this effect was already existing on the Railways.
144	The Station Master on duty should report in writing or by telegram all cases of signal failures irrespective of whether a signal maintainer is available round the clock or not.	Necessary instructions in this regard already exist. These instructions have been reiterated to the Railways
145	Signal failures which actually occur should be faithfully recorded and reported and there must be cross-checks on the reported figures to ensure their veracity.	Necessary instructions had been issued under Board's letter No. 85/Safet-1/ 9/74 (Item145) dated 23.9.1985.
146	(i) Short-cut methods are adopted by (1) signalling staff in their	(i)G.R 52 already prohibits any railway servant from interfering with the signalling

	maintenance work, particularly while rectifying signal failures. The "looping' or bridging of relays, under conditions of failure of a signal, points or track-circuit, by signal staff, either individually or jointly, with traffic staff should be prohibited under rules. (ii) Where any sectional release is required in the interest of train operation, authorised technical solutions like calling on signals and emergency cancellation switches should be employed with built-in safeguards for safe movement of trains.	equipment without the consent of the Station Master. As any short cut method is tantamount to interference within the meaning of GR52, no further elaboration was required. (ii)Instructions issued under Board's letter No.79/W3/SG/RAEC/1 dated 25-6-1985. It was a continuous process, which Railways take into view while executing works.
147	Double locking of all relay rooms by the traffic and signalling staff as a safeguard against tampering with vital equipment in relay rooms and also to guard against the adoption of shortcut methods should be followed.	It was already an accepted policy. No further action is called for.

148	(i) Much higher allocation of funds will be necessary to complete track-circuiting works within a reasonable span of time. (ii) The installation of an adequate number axle counters, whether by import or indigenous production, is not likely to materialise within a reasonable period of time, and, therefore, the original proposal to extend track circuiting using wooden/concrete sleepers for the remaining stations should be preceded with and completed without delay.	This was treated as an Observation. The axle counter had since been developed; was being manufactured indigenously in adequate numbers and was being used extensively for track circuiting works.
149	The portion between fouling mark and advance starter at stations on trunk routes and main lines must be provided with track circuiting using wooden sleepers or axle counters on high priority. Constraints of funds and materials must not be allowed to stand in the way.	Constraints of funds remained in this case also and being of continuous and long-term process, the recommendation was treated as implemented.
150	Track circuiting must be provided at block	As the block huts are stations where trains

	huts also on main trunk routes where the run through main line at stations has been track circuited.	are not booked to stop, it is not necessary to track circuit such stations.
151	On CTC sections where loads remain stabled for long periods, the Railways should take steps to ensure that the conductivity of rails in such cases is maintained at satisfactory levels	Not Accepted. The then M.E commented that this is an "Odd and prohibitively costly method, not worth adopting".
152(i)	The Railway Board should give sufficient thought to the design now being adopted for manufacture of axle counters in regard to its reliability in service. They should not hesitate to adopt imported designs of axle counters if reliability of indigenous design is in question.	152(i) to (iii): The axle counters had since been developed and were being manufactured indigenously in adequate number and being used extensively for track circuiting works.
(ii)	Axle counters should be imported in part to cover the interim period of indigenous development.	
(iii)	The availability of axle counters, from sources within and outside the country, must be stepped up so that works of track	

	circuiting are carried out on a time-bound programme.	
153	While extending the Automatic Warning and Stop (AWS) system on all trunk routes with speed of 100 k/pH and above, covering all passenger and goods trains, recommended in Part-1 of our Report, the last stop signal, which is the authority to enter the block section, should also be provided with AWS equipment, in addition to the first stop signal.	This had been accepted as a policy. The only thing yet to be done was to provide sufficient funds for provision thereof when the recommendation was treated as implemented being of long-term process.
154	AWS equipment provided on the suburban sections of the Western Railway has the necessary infrastructure to facilitate Introduction of a simplified system of cab signalling, which should be provided on such busy suburban sections.	As it was dependent on the success of AWS the recommendation was treated as implemented being of long term process, after consulting the matter with the Directorate concerned.
155(i)	An effective monitoring system should be set up at different levels of maintenance and user departments for protection of AWS equipment from theft and outside interference.	AWS on W.Rly was being provided progressively. It had already been introduced on one section Churchgate Borivilli in February87". On this progress, ED(Safety) had asked to treat the recommendation as implemented.

(ii)	Pilfer-proof housing should be provided for all field equipment of AWS system and circuitry should incorporate earlier warning to the driver if the track equipment is stolen.	"Para 155(ii) had also been taken care of when ED(Safety) had ordered to treat this recommendation as implemented.
156	(i) In view of the serious nature and consequences of collisions on suburban sections, AWS system should be commissioned, on priority, on sub-urban sections of Bombay, Calcutta, Madras on a speedy time-bound programme. (ii) Advance planning for provision of AWS system on suburban sections of the Southern Railway and Sealdah Division of the Eastern Railway should be initiated straightaway.	(i) This had already been accepted as a policy. The only thing yet to be done was to provide sufficient funds for provision thereof. Being of long term process & dependent upon the availability of funds, it was treated as closed. (ii) Same as indicated in (1) above.
157	The AWS system should incorporate a 20 kilometres per hour speed check so that trains, after stopping at an Automatic Signal at 'ON', cannot pick up speed in excess thereof till a signal displaying the	Treated as implemented, being an existing practice.

	'OFF' aspect is reached.	
158	AWS equipment (of the type indicated in Para 317) should be provided not only on all Electric Multiple Unit trains but also on all main line passenger and goods trains running on the section.	It was required to be progressively adopted on other trains in the light of experience gained and constraints of resources. Hence treated as implemented.
159	As an interim measure till AWS system is introduced, an auxiliary warning switch to operate a red light in the motorman's compartment, should be provided as on the South Eastern Railway. This should be operated by the motorman when he stops at an Automatic Signal at 'ON'.	Instructions issued under Board's letter No. 83/Elec. (TRS)113/1 dated 31.3.83. Work had been completed on almost all the concerned Railways
160(i)	A speed limit of 20 KMPH should be specified for normal conditions of visibility under "Stop and Proceed rule in automatic signalling and CTC territories.	Accepted. Necessary Instructions had been issued to the Railways
(ii)	The Guard should be enjoined upon, under General Rules 278 and 437, to apply the brake with a view to bring the train to a stop when he observes the driver exceeding the speed restriction laid down.	Not accepted. In the circumstances mentioned in General Rules 278 and 437, the Guard will be travelling in the engine cab to assist the driver in keeping a sharp look out. The question of his applying the brake, therefore, does not arise.

161	Motormen and drivers of trains in automatic signalling and CTC territories should be given a special course of training in signal training schools covering all aspects of the permissive working, as applicable to Automatic Block and Absolute Permissive Block Systems. Further, they should undergo refresher courses at least once every year.	Accepted. This aspect was already covered in the training given to the drivers and motormen at the various Zonal Training Schools/System training Schools/Safety Camps etc. at the stage of initial recruitment and at periodical intervals. Besides this, the drivers and motormen working in the automatic signalling territories and Centralised Traffic Control territories, are also given one day's training every 6 months and necessary competency certificates issued after testing them. Later, instructions were issued under Board's letters No.E(Trg)80(30)/2 dated 25.3.1980 83/Safety(A&R)/29/7(Pt) dated 27.4.1983.
162	Flashing lights in the rear of EMU trains, similar to those lights in the rear of EMU tram Railway, should be provided as a more prominent of indication to attract the attention of the driver of following train.	RDSO had issued specification to Railways and was implemented by almost all the concerned Railways.
163(i)	Technical measures suggested by a	Accepted. Action had been taken and works

	Committee directors and the ROSO to overcome the problems of flickering/bobbing of signals and also display of more than one aspect by signals at the same time, should be implemented without delay	were in Accepted for minimising the incidences of such bobbing.
(ii)	General Rules 277 and 436 should be amended to include flickering, bobbing and display of more than one aspect by signals at the same time as defective signals on the lines of Rules 78 and 79.	Accepted. Instructions have been issued that when a signal is flickering/bobbing and does not assume a steady aspect for at least 60 seconds it should be treated as defective. A signal which is showing more than one aspect simultaneously, should also be treated as defective in case of a manual Stop signals. In case of automatic Stop signals showing more than one aspect, the most restrictive aspect should be obeyed.
164(i)	The 'cascading' principle should be uniformly adopted on all Automatic Signalling and CTC territories so that when the green aspect bulb fuses, yellow aspect is displayed and so on and, under no	Item No.164(i) & (ii): As advised by S&T Directorate, Instructions already exist to the Railways to provide cascading on Auto Signal Sections. It exists on CTC Sections also except N.E. Railway CTC where it

	circumstances, the driver comes across a signal without any light due to the fusing of signal bulb.	cannot be provided due to "Approach lighting feature".
(ii)	It must also be ensured that not more than one aspect of the signal appears at any one time, by using an improved design of lamp proving relay.	
165(i)	Railways should take steps including use of pilfer-proof fittings to ensure that all telephones at signals on CTC sections are kept in good working condition.	The problem of pilferage of telephone equipment on the CTC section of N.F. Railway had been overcome by providing H.F. Transmitter sets to the drivers. Southern Railway had the same type of arrangement North-Eastern Railway stated that the RAEC report will be kept in view at the time of re-commissioning of CTC on GKP- Chhapra Section.
(ii)	Telephone facility on signals should be provided in non-suburban Automatic Signalling section like Rajkharswan-Sini-Chandil-Kandra on the South Eastern Railway and Sitarampur Pradhankanta on the Eastern Railway.	Telephones in automatic signalling sections are not required as the drivers can pass the automatic signal at 'ON' after observing the concerned GR. Further, provision of telephones would not only be very costly but difficult to maintain on such sections

		and, therefore, is not considered necessary.
166	Maintenance gangs including assistant station masters required for non-interlocked working in the affected yards must be set up on the basis of arrears and normal workload of overhauling of lever frames and similar equipment and coordinated programmes of traffic-blocks should be drawn up for every division.	Instructions were issued under Board's letter No. 81/EB/1200/1. Dated 11.2.1982
167	Yardsticks should be evolved, without further delay, for sectional signal inspectors and signal maintainers based on the workload in equated signal units with due allowance for local conditions.	Since the local conditions and interference from outside elements vary from railway to considerably and the type of railway signalling existing is of multifarious nature, it would not be possible to lay down uniform yardsticks to system in the Railways. be applicable to each system in the Railways.
168	The cadre of signal and telecommunication engineers and signal inspectors must be strengthened to the levels envisaged in the study of the Efficiency Bureau on the workload of these categories.	Accepted. In view of the existing ban on creation of must be posts in one form or the other, creation of posts in the in the supervisory inspectors' category and officers' category had not been

		commensurate with the addition of assets. Over a period of time it is proposed to bring the strength of both officers and supervisors in line with the yardsticks so as to improve the periodicity and quality of the inspections and maintenance. However, treated as closed being of a long-term process.
169	Adjustment of jurisdictions of signal maintainers, provision of adequate rest givers and rostering of signal maintainers on the basis of proper job analysis of their work should be done. The time spent by maintainers in travelling should be properly remunerated. Signal staff for night maintenance on all trunk routes and busy yards should also be provided.	Accepted in principle. Job analysis will be done to givers assess the adjustment of jurisdiction of signal the maintainers, where required. Accepted. The matter had been referred to a Committee of ed. Departmental Council of the JCM for the Ministry of Railways and a decision will be taken in consultation with the organised labour.

		Night maintenance staff already exists at some important busy junctions/yards. The need for providing Night Maintenance staff on trunk routes and remaining important busy yards will be further considered, based on work study to be undertaken in this regard. All these issues were engaging the attention of the administration and changes were being effected within the framework of the rules. However, recommendation No.169 was treated as closed being of a continuous exercise.
170	Testing instruments and equipment required by signal maintainers and signal inspectors for the performance of their duties must be supplied to them and maintained in good order.	
171	Railways should ensure that dual-trained signal inspectors are posted on all sections.	Dual-trained Signal Inspectors are available on all the Railways.
172	Tokenless block instruments should be provided on trunk routes in replacement of	As per the advice received from S&T Directorate, in 1985 about 860 stations out

	the outmoded token or tablet instruments.	of 3840 stations on single line were provided with Tokenless working. Taking an approximate cost of Rs. 3 lakhs per station at that time and assuming that 60% of these will need provision of token-less working, the required outlay was to the tune of Rs.55 crores and time required was about 6 years. Treated as implemented being of long term process.
173	Instructions of the Railway Board for providing bracketed home signals or alternatively track circuiting of main and loop lines with electrical detectors for facing points on sections of multiple aspect upper quadrant signalling with single arm home signals should be complied with by the Southern and Northeast Frontier Railways at the earliest.	In the light of reasonable progress made in this ack regard, the recommendation was treated as implemented as suggested by the S&T Directorate in of 1988.
174	Having commenced the running of super-fast Vaigai Express between Madras-Madurai on the metre gauge system of the Southern Railway, the basic requirements of signalling to permit safe operation of	All the stations were provided with standard III interlocking while 72 out of 73 had multiple aspect signalling.

	trains at that speed must be provided without any further delay.	
175	A satisfactory and reliable communication should be developed between trains in motion and ground station and also between functionaries on the train itself.	This was accepted in principle. Necessary action was on in hand for development of a system. However, as en work was to be executed in phases the recommendation was treated as implemented keeping in view its long-term process.
176	Walkie-talkie wireless pack-sets should be provided extensively in all busy yards for use by traffic and loco staff dealing with movements in the yard.	As quite a few Railways had procured walkie-talkie se sets, keeping in view that a sufficient thrust had been h given, the recommendation was treated as implemented.
177	Handbooks on installation and maintenance of different types of signalling equipment should be prepared and supplied to signal inspectors and signal maintainers for their guidance.	The SEM was under revision and being printed in 2 ☐ parts. Pamphlets prepared by RDSO were also s available. Hand Books for Signal Maintainers were also supplied to Railways from the Board's office.
178(i)	Revision of the Signal Engineering Manual Th should be taken in hand without further delay.	This was already under revision.

(ii)	Copies of the Signal Engineering Manual should T be supplied to all inspectors.	
(iii)	Relevant sections of the Signal Engineering A Manual should be translated into regional Languages and supplied to artisans and maintainers for their better understanding.	As advised by the S&T Directorate the part concerning artisans and maintainers will be published in regional languages.
179	The arrangement whereby reception and departure signals are taken 'OFF' for a train should be restored to their normal position of 'ON' automatically by the passage of a train, incorporating 'one train one slot' principle, should be adopted on both single and double line sections on trunk routes and main lines.	This was already an accepted policy. No follow up was considered necessary.
180(i)	The Railway Board should pursue with urgency Thou development of a suitable indigenous design of last vehicle check device.	Though, the suitable indigenous design of LVCD en of developed by RDSO could not be successful, the Axle Counters Block System which can be considered as an alternative for LVCD are being indigenously manufactured and are installed on Northern, Western and Central
(ii)	Pending development of a last vehicle check Not device, limited import may be	

	resorted to.	Railways. Noted. In view of the expected indigenous development of LVCDs action to import this device was not recommended.
181	RDSO should investigate the use of solar energy for lighting of semaphore signals and even approach lighting of colour light signals.	At that time it was not considered essential to investigate the use of solar energy for lighting semaphore signals or even approach lighting of colour light signals. The recommendation was however, noted for future action. In view of this it was classified as not accepted at that time.
182	The Railways should design all their future signalling systems on the basis of service braking distances. Existing signals on routes, where high speed trains run, should be relocated on this basis.	This recommendation was examined by a committee e of Directors whose recommendations were considered by the Board and several decision were taken. e However, being of a continuous nature and long term process, the recommendation was treated as implemented.
183	A system of modular additions, like the super- Not imposition of another distant signal over the existing signalling system for a block increase of one kilometre or	Not accepted.

	below in braking distance, should be adopted for all high speed routes, as has been done for the route between Howrah and New Delhi.	
184	Any proposal of increase of speed on a route for one train or a class of trains should be treated as a composite project involving the motive power, carriage and wagon, permanent way and signalling disciplines, and braking distance and inter-signal studies should be conducted jointly by all the concerned disciplines.	This was already in vogue.
185	Appropriate steps should be taken to As coordinate the activities in different signalling workshops with a view to utilising their full and production capacity.	As advised by the S&T Directorate. this was already being done through production schedule meetings and coordination meetings.
186	With a view to inject a sense of urgency and appreciation of the impact of signalling on safety and efficiency of train operation and evolve measures for speedy implementation of such projects on a planned basis, the decision making body in the Railway Board needs to be strengthened	In view of the resources constraints it was very unlikely that any strengthening of manpower in the Board was acceptable. Also due to financial constraints the number of works being carried out had come down, and hence, considering the present set up in the S&T Directorate

	at the appropriate technical level.	adequate at that time, it was closed.
187	Steam locomotives are going to be with the Railways for a long time to come, therefore, the organisation for their maintenance must not be weakened. Nothing should be done to reduce the effectiveness of this organisation by redeployment of well-qualified personnel to the diesel/electric side.	The necessity for proper maintenance of steam locomotives was recognised and it was ensured that it s not sacrificed. Implemented.
188	Headlights in steam locomotives must be Ace maintained in fully operative condition.	Accepted. Instructions to maintain headlights of all Sikri Committee Part-II Contd. locomotives in operative condition exist. The same had, however, been reiterated.
189	Sanding equipment should be pr provided and maintained in proper working order on steam locomotives. This equipment should be specially certified at the time locomotive leaves the shed.	Accepted. Proper attention to maintenance of sanding equipment was a necessary feature of be existing schedules. The extent instructions had been es reiterated. Implemented.
190	(i) Installation of the vigilance control device in diesel and electric locomotives, need Bo not be pursued under conditions of	(i) Instructions were issued to Zonal Railways under ed Board's letter No.73/M(L)/466/112-Pt.III dated 19-8- in 1981.

	train 19 operation now obtaining on the Indian Railways, namely, two employees manning every diesel and electric locomotive. (ii) The vigilance control device may find application if and when the Indian Railways adopt a system of single manner crews on diesel and electric locomotives. Research and developmental efforts for evolving a suitable design, which will function satisfactorily Di without the present disabilities may be continued.	(ii) Instructions issued under letter indicated in (i) s above. However, decision to modify the existing design of VCD to make it easier to operate without ◉ introducing the fatigue factor had already been taken e and was under implementation by S&T & Mech. Directorate of RDSO.
191	VDO speedometer in use at present on the In Railways, which was designed for motor N vehicles, is not suitable for locomotives. Import of Hasler speed recorders must be pursued with a sense of urgency.	Instructions were issued under Board's letter No.77/M(M&P)/467/4 dated 21-7-1981.
192	Considering that the speedometer problem has A been with the Railways for nearly two decades, a we feel that there has been a	As advised by EDME(Dev.) in March'89, the supplies against the development order placed on M/s Automatics, had started. The

	lack of A determined effort to develop a suitable s speedometers/speed recorders indigenously.	first sets had been supplied to C&W for electric locos and the firm was likely to continue their supply, hence, the recommendation had been complied with.
193	The new procedure for changing charts of T speed recorders on locomotives, in force since d Jan., 1980, according to which the driver has s full access to the speed recorder charts, is apt f to defeat the very purpose for which speed recording is found to be necessary.	The system of changing speed-recorders charts by the drivers was revised in December, 1981 and the shed staff again made responsible for changing and proper fitment of speed recorder charts.
194	Equipment of the type on trial on the Kottavalasa-Kirandul section of the South Eastern Railway, which gives a clear indication to the driver in case of train parting, would be useful and its trials should be expedited.	The equipment on trial on K.K. section was suitable only for air braked trains and cannot be used with vacuum braked trains. This was, therefore, considered for implementation in air braked train; are to be introduced on a large scale by Indian Railways. Hence, treated as closed being of long-term process.
195(i)	Working of diesel locomotives with long hood leading has greater accident-proneness and also presents more difficulties in visibility of track and signals.	(i)to (iv): Not accepted. Diesel locos other than those provided with end cabs are designed to provide adequate visibility even with long hood leading.

	In the overall interest of safety, trains should not be worked by diesel locomotives with long hood leading.	
(ii)	As a beginning, this restriction may be imposed on all passenger carrying trains with maximum permissible speed of 100 kmph and over on the broad gauge and 75 kmph and over on the metre gauge.	
(iii)	This safety measure should also be extended to all trains hauled by diesel locomotives which run over difficult sections where the visibility of signals is restricted due to sharp cuttings, curves, etc.	
(iv)	As a long-term solution, provision of a second driving cab on diesel locomotives should be given serious consideration.	
196	Water level gauge in WDM2 diesel locomotives should be modified so as to serve the purpose for which it is intended.	RDSO had already modified the location of water gauge glass. DLW had also taken action to implement it vide their change notice NO.CDE/C/82/2/BG.01 dated 23-5-84, RDSO had also advised the Railways vide their letter No.SD.Design.5 dated 16-

		6-84 and 3-7-84.
197	Cow-catchers and headlights should be provided in the rear of WDM1 Locomotives.	Not accepted. WDM1 locomotives are provided with driving cab at the front end work with cab leading. Provision of cow-catchers and head lights in the rear was not considered necessary.
198	Adequate maintenance facilities should be provided in workshops and sheds for electric locomotives. These should keep pace with additions to the electric locomotive fleet.	Instruction issued under Board's letter No.83/Elec(TRS)/113/1 dated 31-3-83. However this was a continuous exercise and expansion plan had been formulated.
199	All diesel and electric locomotives and electrical multiple units manufactured in the country should be provided with the basic fittings so that mounting of AWS equipment on the driving unit could be done with difficulty	Since the AWS was successfully installed in the EMUS on the Churchgate-Virar section of Western Railways, this recommendation was treated as implemented.
200	It must be ensured that the bell communication between motormen and guards on EMU trains is maintained satisfactorily.	Instructions were issued under Board's letter No.83/Elec(TRS)/113/1 dated 31-3-1983. Implemented by all the concerned Railways.
201	A reliable locking arrangement should be devised for the unoccupied	Instructions were issued under Board's letter No.83/Elec(TRS)/113/1 dated 31-3-

	motorman's/guard's compartments in EMU trains.	83. RDSO had clarified that existing hinged type locks with pad lacks are considered to be most suitable. Implemented on all the Railways.
202	The Railway Board should set up a committee A consisting of officers of the mechanical and pa operating departments who will go into the ne pattern of goods train examination and le rationalise it on an all-India basis, stipulating 19 the places where examination should be Ne carried out together with the type of examination to be done, and the time, facilities, equipment and manpower required for this purpose. The work of this Committee should be completed as quickly as possible.	A committee was set-up in 1979 to rationalise the pattern of goods train examination. Thereafter, necessary instructions were issued under Board's letters No.80/M(W)/814/39 dated 7-8-1981 & 15-10- 1981 which were later reiterated under letter No.80/M(W)/7/12 dated 21-6-1983.
203	Skipping of examination of goods trains should, In ordinarily, not be permitted, but in case it becomes unavoidable, arrangements must be made to get the load examined within the shortest possible distance thereafter.	Instructions reiterated under. Board's letter No.83/M(N)/951/54 dated 16-9-1983

204	The practice of examining goods loads on sorting lines in marshalling yards should be H stopped wherever it exists.	It was not practicable to implement it in every yard. However, necessary instructions were issued under Board's letter No.83TT(1)/86/1 dated 7-4-1983.
205	The practice followed on the South Eastern M Railway deputing a mobile gang to examine a le stabled load and give a fresh vacuum 1 certificate, before it is allowed to move, should be adopted on other Railways.	Necessary instructions were issued under Board's letters No.80/M(N)/7/3 dated 9-7-1981 and 7/11-6- 1985.
206	Adequate brake power and proper I maintenance of brake rigging must be ensured.	Instructions reiterated under Board's letter No.80/M(N)/7/4 dated 3-8-81.
207	Railways should take steps to see that the vacuum gauges are invariably provided in in guard's brake vans of all passengers carrying trains.	It was already the existing practice. However, instructions were reiterated under Board's letter No.85/M(C)/137/8 dated 11-3-85. Almost all the railways had confirmed the action.
208	It must be ensured that guards have a vacuum gauge fitted in the brake vans of goods trains. I There is need for providing a satisfactory fixing arrangement for vacuum gauges.	Necessary instructions were issued under Board's letter No.80/M(N)/951/45 dated 10-7-1981.

209	The Railways should undertake trials to determine the extent of the loss of brake power in different trains, under actual field conditions, and take remedial measures accordingly.	Adequate data had been collected by RDSO and necessary instructions issued to the Railways by RDSO and the Board for taking remedial measures to improve brake power. Instructions by Board were issued under letter No.84/M(N)/951/101 dated 31.12.84.
210	Recommendations made by the RDSO regarding introduction of air brakes should be examined by the Railway Board and an early decision taken thereon.	A post of Addl. Director (Air brake Dev.) had been transferred from South Eastern Railway to be operated in Board's Office for this purpose The incumbent was already in position. Plans were in hand to develop designs for hoppers with Air brake system for carrying commodities like foodgrains, cement etc. Plans were also in hand to manufacture a few more rakes with A. B. system at ICF during 1986-87 and 1987-88. Keeping in view the action taken and planning done, the recommendation was treated as implemented.
211	With a view to ensuring satisfactory examination and maintenance of coaching stock:	

	(i)	Timely placement/withdrawal of rakes on/from pit lines must be ensured;	Instructions already exist in relevant Conference Rules were reiterated vide Board's letter No.80/Chg.II/22/17 dated 19-5-1981. Instructions were issued vide letter No.83/PL/53/2 dated 30-4-1983 & Planning Directorate was chasing the matter with Railways.
	(ii)	adequate stabling capacity must be created to stable examined loads and release the pit lines for placement of other rakes;	
	(iii)	Railways must immediately undertake a review of the pit line facilities and equipment required and make up the deficiencies on a time-bound programme;	This item comes under the heading "Continuous implementation through Works Programme", hence, treated as implemented.
	(iv)	all pit lines should be long enough to accommodate the longest passenger-carrying train in service and that contemplated in the near future;	Same as in Item (iii) above.
	(v)	adequate lighting of pit lines should be ensured;	Same as in Item (iii) above.
	(vi)	drainage in pit lines should be improved. Perhaps a change in the basic design of the pit is called for; and	Same as in Item (iii) above.

	(vii) all slip coaches should be examined on pit lines.	Same as in Item (iii) above.
212	(i) The Railways should be extremely cautious in the matter of introducing new train services and extending the run of the existing one. They must ensure that adequate maintenance facilities for carriages are created before new services are introduced.	Necessary instructions were issued under Board's letter No.80/Chg.II/16/23 dated 29-5-1981.
	(ii) In the face of popular demand for more and faster trains there are obvious limits to the resistance which the Railway Board and Zonal Railways can put up. The political authority in the country should also not stretch the Railway system too far.	ii) Same as in Item (i) above.
213	Modernization of sicklines and depots covering the provision of facilities like sheds, flooring, pathways for workers, plant and machinery, equipment for handling	Based on Railways' suggestions and also keeping in view the latest pattern of goods train examination and coaching needs, a plan for modernisation of C&W

	materials, requirements of electric power, recruitment of staff and their training should be taken up as a project . A task force, not bothered by the day to day stresses of railway working, must be set up to carry out this work within a period of five years. Necessary resources will have to be provided.	Departments during the VII Plan had been drawn up f and the Railways had been asked vide Board's letter No.84/M(W)/814/63 dated 8-1-1986 to take action regarding preparation of detailed proposals for inclusion in the Annual Works programme accordingly. A task force had also been set up by Board for preparation of the report vide Board's letter No.83/M(N)/951/102 dated 7-3-86. Being a long term nature of implementation, the recommendation was treated as implemented.
214(i)	POH of coaching stock should be planned on the basis of kilometres earned so that more f intensively worked rakes are given POH at t shorter intervals than at present.	It was already an accepted practice to give more frequent attention to coaches running on Mail/Express trains which earn more kilometreage.
(ii)	Arrangements to take up the increased workload of POH should precede the stipulation of revised intervals between two POHS.	Does not arise. Classified as Not accepted.

(iii)	The requirement of spare coaches should also be reviewed having regard to the fact that the coaches will have to be sent to the workshop more often.	Does not arise. Classified as Not accepted
215	EMU services should be so planned as to provide for the required time in shed. The Eastern Railway Administration should expand the existing facilities for POH/AOH to meet the maintenance requirements in full.	Instructions had been issued under Board's letter No.83/Elec(TRS)/113/1 dated 31-3-83. As per the position received from Railways through Elec(TRS), this was being ensured by all the concerned Railways. Eastern Railway had also advised that these were "planned properly". POH/AOH facilities augmented through sanctioned works programmes.
216(i)	The standard of maintenance of roller bearings in workshops should be improved so that attention to those on line does not become necessary at all during the intervals between two POHS.	Instructions to the Railways to this effect already exist. However, Railways were taking action to modernise facilities for maintenance of roller bearings in the workshop by including the requisite works though the annual works programme, which was a continuing process.
(ii)	If, however, the Railway Board and the Railway Administrations feel that inspection of roller bearings between two	The quarterly inspection of Roller Bearing on coaches running on Mail/Express trains

	POHs is absolutely necessary, then conditions similar to those obtaining in workshops should be created in nominated sicklines and maintenance depots.	had given good results and reduced potential failures on run. It had, therefore, been decided to continue this practice. During quarterly examination by depots, no repairs were executed but the bearings were only inspected and wheelsets with suspected bearings were withdrawn and sent to workshops for repair. Since no repairs were carried out at the time of this inspection, creation of facilities in sicklines similar to those in workshops was not considered necessary. In view of the action being taken against recommendation No.216(i) no action was considered necessary on this recommendation. However, where intermediate inspection of bearings becomes necessary, facilities as close to workshops as possible were being provided. Besides, a new design of Roller Bearings known as cartridge bearing had been introduced in the latest freight stock. This bearing normally does not require any field attention.

217	The Railway Administrations should take urgent steps to provide adequate facilities for inspection and maintenance of roller bearings in workshops.	Adequate facilities exist in Railway workshops required to inspect and maintain roller bearing rolling stock. However, where short falls exists they are reviewed periodically and remedial action taken.
218	The recommendations made by the One-man Out Committee on roller bearings should be implemented expeditiously.	Out of 87 recommendations made by the one man committee, 16 recommendations were not considered acceptable. Of the remaining 71recommendations, 65 had already been accepted and implemented and the remaining 6 were at trial stage when this recommendation of Sikri Committee was treated as implemented.
219	The RDSO should develop some device to monitor the condition of roller bearings fitted on stock without the need to open them.	A Shock Pulse Monitor had been developed by IRISET, Secunderabad for this purpose.
220	An urgent dialogue should be opened with the RDS manufacturers of roller bearings, who should man be apprised of the failures in service, for effecting improvement in	RDSO was regularly having a dialogue with the manufactures so as to improve the performance of indigenously manufactured roller bearings.

	the product.	
221	The Workshops and depots on the Zonal The Railways should follow a uniform system of giving identification numbers on roller bearings and maintaining record of the axle number on which it is mounted.	The practice recommended by RAEC was already being followed in railway workshops. At that time roller bearings were not changed in depots.
222	In order to check the overloading of box A p wagons: Weigh-bridges capable of weighing wagons on the move be provided at coal and mineral loading points.	A policy decision had been taken that whenever an existing railway weigh-bridge is required to be replaced at coal and mineral loading points, the same should be replaced by an electronic weigh-bridge. Instruction had also been issued that wherever new major loading points involving bulk loading are developed the yard layout must provide for in-motion loading over an electronic weigh-bridge which will cut off the possibility of overloading electronically. (Instructions were issued under Board's letter No.TC- 1/80/108/7 dated 5-10-82 and

		TC-I/84/108/1 dated 20-1-84)
(ii)	Arrangements be made for the proper upkeep Ins and maintenance of weigh-bridges;	Instructions already exist for periodic test checks of weigh-bridges with a view to correcting inaccuracies, if any. The Railways had also been instructed to ensure that in the event of any weigh-bridge going out of order, the same is attended in time. All the Railways had also drawn up maintenance schedules for weigh-bridges and these were being observed.
(iii)	Deterrent penalties like confiscation of Ra materials in overloaded wagons be considered.	Railway Administrations as carriers of goods are not legally empowered to impose the penalty of confiscation of materials in overloaded wagons, but can impose a penalty such as levying double the freight charges at the highest class rate when overloading is detected en-route or at destination. This was already being done under the extent rules.
231(i)	Expeditious steps should be taken by the St Railway Administrations to improve the quality Ac of laminated springs	Steps were already being taken by the Railway Administration to improve the quality of laminated spring manufactured in

	manufactured in Railway Workshops.	Railway workshops. 5% load deflection testing of springs was already being done.
(ii)	Statistically optimum sample size should be Ba ascertained, and that percentage of springs should be subjected to load deflection test in da workshops.	Based on RDSO's recommendation, Railways had been advised vide Board's letter No.82/M(W)/814/70 dated 26-11-85 to subject 5% of the springs to load deflection test for acceptance of the lot. If any one spring fails, then 100% load deflection test is to be carried out.
224	The Practice of moving BOX wagons over long distances with clamped broken bearing springs is unsafe and should be curbed effectively.	Accepted. Instructions have been issued that the wagons will be moved in clamped condition only up to the next nominated yard where the springs will be attended. This will prevent movement of BOX wagons with clamped broken springs over long distances. (Instructions issued under Board's letter No.82- TT(1)/9/3/CRB/0/30 dated 19-4-1982).
225	The practice of turning out wagons from sick Ace lines and depots with broken helical springs the should be stopped	Accepted. Suitable instructions had been issued to the Railways. The use of reclaimed springs stopped. No wagons

	forthwith.	were turned out from sickline and Depots with broken helical springs.
226	In view of the large scale failures of axles on Th carriages and wagons on the metre gauge, the co RDSO must investigate the practice of using old broad gauge axles for metre gauge rolling stock. The desirability of pressing out old wheel discs from usable axles must also be gone into.	The practice was reviewed by the Board in consultation with RDSO in Dec., 1979. The procedure laid down was based on technical considerations and incorporates sufficient safeguard so as to ensure a good and safe final product. The subject of pressing in and pressing out of wheels had been investigated by RDSO. Instructions to ensure greater accuracy on tolerances had been issued to ensure proper repair practice. Revised instructions issued under Board's letter No.84/M(W)/814/94 dated 28-7-1986.
227	Adequate equipment for ultrasonic testing of all axles should be made available in workshops and maintenance depots.	Ultrasonic testing equipment was indigenously available. All railways had been advised to ensure 100% testing of all axles of the rolling stock.
228(i)	Provision of modified draw bar on metre gauge goods stock should be completed	Draw bars of enhanced capacity were being fitted to MG stock, newly manufactured or

(ii)	within the shortest possible time. Quality control and testing of material for draw A bars and process control during their h manufacture should be tightened.	during POH. Implemented. Accepted. Instructions for tightening quality control had already been issued by RDSO.
229	(i) The Neutral Control Organisation (should be brought under the charge of Director Mechanical Engineering in the Railway re Board. (ii) Neutral control examination should be extended to all workshops and major carriage and wagon maintenance depots. (iii) At the remaining depots and sick lines, C neutral control staff can be deputed on a selective basis depending upon importance of the unit.	(i) Board had taken the decision that it was essential that the Neutral Control Organisation takes the required guidelines and instructions on technical & administrative matters from the Railway Board. (ii) This was already an accepted policy. (iii) This had since been done. The deployment of Neutral Control Staff had been rationalised for open line.
230	Railway Board should finalise expeditiously the list of defects in coaching and goods stock which have a direct	List of defects having a direct bearing on safety pertaining to goods and coaching stock had been finalised. IRCA had brought

	bearing on safety or 'S' marked items in the Conference Rules.	out such defects in its book, Part-IV.
231	Hand books for the guidance of Carriage and Wagon maintenance staff should be brought out in local languages for the benefit of staff not knowing English.	Instructions issued nominating Railways to print the hand book in various regional languages under Board's letter No.80/M(N)/7/3 dated 27-6-1989.
232(i)	While ordering safety modifications, the Railway Board should lay down a period within which these should be completed. The Zonal Railway Administrations should have the authority to sanction additional manpower required for this purpose.	232(i) to (iii): Recommendations were accepted in principle and instructions issued vide Board's letter No.80/M(N)/951/54 dated 5-4-1983, 18-4-1983. Treated as implemented being of continuous process.
(ii)	A special drive should be launched to complete all pending safety modifications on coaching and goods stock speedily.	
(iii)	Neutral train examiners posted in workshops should make a special check on the execution of safety modifications on all coaches/wagons turned out of workshops.	
233	Replacement of old and obsolete machines in workshops should be done at a faster pace.	Funds provided for replacement of old and obsolete machines in workshops during 1982-83 to 1986-87 indicate that 2/3 of the

		total allotment for M&P for all Indian Railways was being allotted for replacement of old machines which shows that replacement of old and obsolete machines in workshops was being done at a faster pace. Hence, the recommendation was treated as implemented.
234	The hand-brake in EMUs should be provided in the motorman's cab.	Not accepted. In the Board meeting held on 13-4- 1989, it was decided that "the proposal has not been found feasible after trials by RDSO".
235	There is need for further research into the problem of corrosion in steel-bodied coaches. This should be undertaken in collaboration with other research institutes.	A standing committee on corrosion comprising senior officers from RDSO and Railways already exists where experts from other than Railways are associated as special invitees towards effecting improvement in corrosion resisting characteristics of steel bodied coaches. The Mech. Directorate had started Implementing the recommendations by procuring materials which have properties to increase corrosion resistance. A corrosion monitoring cell in Board's office

		was also proposed to be set up so that the problem of corrosion is tackled on regular long term basis. This was a continuous process.
236	Problems arising out of the greater height of coupling in C.R.T. wagons than in other types should be examined and remedial action taken.	Accepted. The problem of coupling height in CRT wagons had already been examined and remedial measures had been taken for future builts. Necessary action taken by RDSO
237	Railway Board should plan production of adequate number of anti-telescopic steel bodies SLRs and Coaches for broad and metre gauges to ensure strict compliance of marshalling instructions.	A decision was taken that all new BGAMG coaches will be built to integral design. BEML and Jessop who were building non-anti-telescopic coaches were asked to switch over to the integral design. BEM switched over in 1977-78 and lesson, we.f. 1986-87. It will be sometime before all non-anti-telescopic SLRs get replaced by anti-telescopic ones.
238	In the light of experience on the railways, the advantages of using centre buffer couplers on coaching stock in reducing casualties during accidents should be examined with a view to determining	It was decided in Board meeting of 7th & 8th May'85 that CBC's should be fitted (along with airbrakes, UIC vestibules and 110V PC system) on new coaches to be manufactured in ICF for being utilised on

	whether it would be desirable to adopt this on the Indian Railways.	rakes of North-South Express trains like Tamil Nadu Express, A.P. Express etc. In pursuance of this directive ICF had floated a global tender for procurement of AAR'H' type tight lock couplers and offers received were under evaluation in 1986.
239	The Safety Organisation should primarily be a service organisation and not an executive department. The responsibility of ensuring safety on the Railways is squarely that of the different departments and their accountability in this respect must not be diluted.	This was an existing practice. All departments in the Railways are responsible for ensuring maintenance of assets and operation in a manner as not to jeopardise safety of train operation.
240	The Safety Organisation should be manned by officers from any of the 5 major departments, namely, Operating, Civil Engineering, Mechanical Engineering, Signal Telecommunication Engg. And Electric Traction, which are mainly concerned with safety in train operations.	Safety of train operation is an integral part of railway operations. The affairs of this Deptt. can be best managed by the officers drawn from operating deptt. No change in the staffing policy of Safety Organisation at that time was, therefore, considered necessary.
241	At the divisional level, the Divisional	This was already the accepted practice.

	Safety Officer should put up periodic reports to the Divisional Railway Manager/Divisional Supdt. on deficiencies and problems so that the latter can get the executive officers to take action. At the headquarters level, the Chief Safety Supdt. should report directly to the General Manager.	
242	Men of ability and dynamism should be posted 1 to the Safety Organisation to dispel the E impression that it is a refuge for unwanted people.	Instructions were issued under Secretary, Railway Board's letter No.85/Safety-1/40/1 dated 23-1-1985 to carry out a review of the DSOs posts. GM's assured the action.
243	Persons posted to the Safety Organisation In should have a minimum tenure of two years.	Instructions issued under Board's letter No.E(O)III- 04003/15 1 3-1984
244	The Divisional Safety Officer should be relieved In of his miscellaneous functions and left free to u concentrate on his main responsibility of 15 promoting safety on the division.	Instructions in this regard were, inter-alia, reiterated under Board's letter No.E(O)III-84TR2/15 dated 1-3- 1984.
245	The status of the Divisional Safety Officers should be brought on par with divisional officers of other executive departments.	Some of the Divisions had already been provided with J.A. Grade posts. Since all DSOs were supposed to report directly to

		DRMs, the intention of recommendation had also been met with.
246	Each division should have safety counsellors from the four main disciplines, namely, Operating Civil Engineering, Mechanical Engineering and Signal and Telecommunication c Engineering. There should be provision to add le to these counsellors from specialised 1 disciplines like Electric Traction, wherever necessary.	There were already a number of Safety Counsellors of various disciplines in the Divisions. Sanction regarding inclusion of safety counsellor (Signals) in safety organisation on Railways were issued under Board's letter No. E(NG)II/87/PO/Genl/2 dated 23-8-85 and 10-8-87.
247	Safety counsellors should be appointed after a careful selection so as to ensure that they let have, in addition to some technical background, a proper understanding of human nature and a flair for counselling work.	Necessary instructions had been issued under Board's letter No.E(NG)I-85PM1-15 (RACE-78) dated 6-12-1985
248	The persons selected as Safety Counsellors should be given appropriate training in let counselling techniques.	Necessary instructions had been issued under Board's letter No.E(Trg)82 (21)/2 dated 7-8-1982, 23-3-83 and 3-4-1984.
249	An effective system of monitoring the follow up action on recommendations made by the committees of inquiry into railway accidents en should be followed at the	Suitable machinery for watching implementation of the recommendations made by the committees of enquiry into rail accidents already exists on the railways and

	divisional and rai headquarters levels of Zonal railways.	the same has been tightened up.
250	Regular statistical studies must be done at the Th divisional and headquarters level of zonal Railways to analyse the short and long-term trends of various types of accidents and take remedial measures.	This was an accepted policy.
251	Safety should be the only charge of Director, Ne Safety in the Railway Board. He should also me coordinate the efforts of Zonal Railways in the field of safety.	Necessary orders were issued under Board's wireless message No. ERBI/82/6/3 dated 9-3-1982.
252(i)	The term "accident" should be applied to only the consequential accidents (Group I) and certain categories of miscellaneous accidents under Group III.	Accepted. However, statistics of failure of equipment and miscellaneous accidents may continue to be presented to Parliament as distinct from statistics of consequential train accidents (Group 1). The definition of accidents need not be changed for the purpose of control by the Railway Administrations. None of the miscellaneous accidents listed in Group III need be transferred to Group-I. As the status quo had been maintained, no further action was necessary. Later,
(ii)	Train partings should continue to be reckoned Not as indicative accidents.	

		instructions on definition of accidents and groupings were issued under Board's letter No.88/Safety(A&R)/29/8 dated 18-4-88. Not accepted. Train partings are essentially failure of railway equipment and are correctly classified as such in Group II. However, train partings will be recorded separately under the sub-group failure of couplings and draft gear so that they receive due attention of the Administration.
253	Every case of rail fracture should be reported and included in the statistics of permanent way failures.	Instructions already exist on the Railways to enter all cases of rail failures in the section register of the Permanent Way Inspector. This is to serve as a basic record for statistical purposes or for ascertaining the need for renewal of the track. Instructions have, however, been reiterated to the Railways that all cases of rail failures are invariably entered in the section register of the P.W.I.
254	A methodology should be evolved by which failures of tyres, wheels, axles, etc., are reported in totality to the Railway	Necessary instructions had been issued under Board's letter No.83/M(N)/960/1 dated 3-2-1983 to RDSO.

	Administrations irrespective of the damage and other consequences.	
255	The criterion of detention to traffic for classifying failures of signalling apparatus as failures of railway equipment should apply not only in the case of failures of route relay interlocking and CTC installations but also in the case of failures of other signalling and interlocking gears.	Instructions were issued under Board's letter No.85/Stat(Accdt.)/32/RAIC-1978-Pt-II/View dated 5- 7-1985.
256	Accidents like derailments of light engines, trolleys, vehicles and wagons, etc. which occur in yards and at stations must be all reported irrespective of the cost of damage involved. Statistics thereof should be compiled and analysed for taking remedial measures.	All accidents including accidents in yards involving light engines, trolleys etc. are reportable to officials at appropriate levels. Their statistics are also maintained for analysis and remedial action at appropriate levels.
257	Truthful reporting and compiling of all accidents must be ensured so that accident records reflect the true picture of performance in the field of safety in operations.	Necessary instructions had been issued.
258	Maintenance of accident records, both at the divisional and headquarters level, must	Accepted. Necessary instructions had been issued.

	be placed on a satisfactory footing.	
259	The Commission of Railway Safety should be placed under the Ministry of Railways but independent of the Railway Board. The Chief Commissioner of Railway Safety should have direct access to the Minster of Railways. He should also be given a suitable status.	It would be in the best tradition and in maintaining public confidence if status quo in this regard is maintained. As regard other two aspects, the further action was required to be taken by M/O Civil Aviation.
260	The officers of the Commission of Railway Safety should be empowered to summon witnesses from the public as in the case of Commissions of Enquiry.	Accepted. Necessary provision was being included in the Indian Railways Act, which was under revision. Since the bill had been passed by the Parliament and provision was made therein accordingly, the recommendation was treated as implemented.
261	The officers of the Commission of Railway Safety should be permitted to issue a brief press note giving the factual position and findings in non-technical language after the Inquiry has been completed.	Instructions issued under No.84/Safety(A&R)/5/1 dated 26-6-1985.
262	A few accredited representatives of recognised M railway passenger associations and the press F should be	Necessary instructions issued by Commission of Railway Safety vide their letter No.RS-13-T-(8)/34 dated 22-4-1986

	permitted to be present at the c inquiries conducted by officers of the u Commission of Railway Safety, except where 6 the inquiring officer feels the need to take evidence in camera.	were circulated to Zonal Railways under Board's letter No.86/Safety(A&P)/48/2 dated 4- 6-1986.
263	No railway officer should be allowed to sit with C the inquiring officers of the Commission of ci railway Safety during the course of the inquiries.	Commission of Railway Safety's instructions were circulated to Zonal Railways under Board's letter No.86/Safety (A&R)/48/6 dated 22-7-1986.
264	The practice of sending the draft report of inquiry to the Railway Administration and the Railway Board should be given up.	There appears to be a misapprehension in this matter. The practice of sending draft report was given up in 1974 pursuant to the recommendations of the Railway Accidents Inquiry Committee-1968 (Wanchoo Committee). It is only the final reports that are now forwarded by the Commissioners to the Controlling Ministry, the Railway Board and the Railway Administrations.
265	All derailments and collisions involving super fast trains, irrespective of the casualties, should be inquired into by officers of the Commission of Railway Safety.	Instructions issued under CRS, M/O Civil Aviation's es, letter NO.RS.13-T(4)/83 dated 11-11-11986. Copy of he this was also circulated to Zonal Railways under Board's letter Dated 13-1-87. No.86/Safety-

		1/9/15(Mud-265)/Pt. Dated 13-1-87
266(i)	The system of independent annual inspections by Commissioners of Railway Safety should be revived.	Not accepted. The Commissioner of Railway Safety is be empowered to inspect any section. System of independent annual inspection is not considered necessary.
	Maintenance Certificates submitted by the various heads of Departments of the Zonal Railways, which are appended to the Annual Reports of the General Managers, should be countersigned by the Commissioners of Railway Safety, as was the practice in the past.	Not accepted. Since the maintenance is the al responsibility of executives, the countersignature by al CRS is not considered necessary.
267	The Commission of Railway Safety should be expanded so that each circle covers one Zonal Railway only.	Necessary orders were issued under Ministry of al Tourism and Civil Aviation's order No.RS.25-N(45)/80 dated 15-2-1984.
268	The Deputy Commissioner (General) at the headquarters of the Commission of Railway Safety should be in the rank of a Commissioner. He should normally be drawn from a discipline different to the one to which the Chief Commissioner belongs.	The recommendation that the Deputy Commissioner y of Railway Safety (General) at Headquarters of the a Commission should be in the rank of a Commissioner mis accepted. However, there seems to be no reason why the incumbent of this post should be drawn from a discipline different from that of the

		Chief Commissioner. The best available candidate should be selected irrespective of the discipline to which he belongs. Later this recommendation was re-classified as Not accepted.
269	The Government must take special steps to see that vacancies of Commissioners of Railway Safety and other officers of the Commission of Railway Safety are not allowed to lie unfilled for long.	Filling up of vacancies in the Commission is dependent on the adequacy of response from eligible Railway Officers. Some measures had then recently been initiated to invoke greater response for the posts of Commissioners by way of higher initial start in the pay scale and by widening the field of recruitment. Later, the recommendation was treated as implemented in consultation with the officer of the CRS on 31-1-1986.
270	All reports of inquires into accidents made by officers of the Commission of Railway Safety should be published promptly without exception.	Existing procedure of publishing reports on selective basis was considered to be adequate and continue.
271	Delays in the publication of annual reports of the Commission of Railway Safety should be avoided.	Noted. Some time-lag in the publication of the report is inevitable, since reconciled statistics of accidents would be available

		with the Commission only about 4 months or so after the close of the financial year. However, avoidable delays in publication will be obviated. Later, treated as closed in consultation with officer of CRS on 7-3-86.
272	The setting up of a National Transportation Safety Board on the same lines as in the USA must be considered by the Government.	The question of setting up of a National Transportation Safety Board on the same lines as in the U.S.A had been considered by a Committee of Secretaries which felt that, at that stage it was not feasible to constitute a single Board to deal with and administer safety measures pertaining to all modes of transportation on the pattern of N.T.S.B of U.S.A. However, an Apex Body could be constituted to generally oversee the implementation of safety measures by concerned Ministries/Departments and to function as a clearing house for policies, practices and standards of Safety Organisations connected with different sectors of transportation. Concerned Ministries and Safety Organisations could be represented in this Apex Body.

		Setting up of a National Transportation Safety Board on the same lines as in the U.S.A was, therefore, not considered appropriate at that stage. However, the question of constituting an Apex Body as proposed by the Committee of Secretaries was under active consideration of the Government. (This recommendation was, hence, classified as Not accepted). (Later such a body namely NTSB set up on 10-9-1987 had been wound up w.e.f 1-4-1990).
273(i)	There is the need for a more enlightened policy in respect of recruitment and promotion of personnel in the RDSO with a view to attracting and retaining really top class talent.	Since scales of pay of Government Officers/staff have been standardised by the 3rd Pay Commission and are uniformly applicable in all departments of the Government, it is not possible to take up the recommendation for the RDSO personnel in isolation.
(ii)	Officers in RDSO should be retained for a minimum tenure period of 5-6 years.	Normal maximum tenure has been fixed as below:

		For Dy. Directors - 3 years Jt. Director - 4 years Addl. Directors/Directors - 5 years An officer initially posted as Dy.Director and later promoted as Joint Director will continue for a total period of 4 years. Similarly, a Joint Director promoted as Addl. Director/Director in RDSO will have a total tenure of 5 years. Necessary instructions exist and were followed.
(iii)	Officers engaged on specific projects in should not be transferred till after the a completion of the project. The service and in promotional prospects of such officers should a be fully safeguarded.	Decision to transfer an officer from RDSO is taken after due consideration of all aspects of administrative interest. Promotional prospects of officers in RDSO are safeguarded. Necessary instructions exist and were

		followed.
(iv)	The permanent cadre in RDSO should consist of persons with higher basic qualifications and to make this possible the pay scales should be more attractive.	Not accepted.
274	The RDSO should be relieved of routine A inspections of all items except those pertaining u to the development of new projects, 1 equipment and materials.	Accepted. Necessary instructions had been issued under Board's letter No.ERB-1/80/44/40 dated 19-9- 1984.
275	The RDSO should have complete powers to T procure all stores required for research and c development in respect of projects approved by the Railway Board.	The D.G/RDSO had been delegated powers upto one crore of rupees in Stores matters. He also exercises the powers of a G.M in terms of Board' letter No.F(X)II-77/PW/5 dated 7-12-1977.
276	For effective monitoring of projects/rolling stock initiated by the RDSO in the field, Zonal u Railways should nominate one senior officer of In the concerned department to liaise with the RDSO.	Necessary instructions were issued to Zonal Railways under letter No.ERB-1/80/44/40 dated 4-9-1982. Implementation reports were also received from Railways.
277	The Railway Board should give priority to the setting up of a test track in the RDSO at the earliest.	Accepted. As per the C.E. Directorate, the test track was being established at Mughalsarai, hence, the recommendation was treated as implemented.

278	The RDSO must be given powers in line with other premier research institutes in the Al country, to enable them to depute their se officers and staff to participate in appropriate seminars and conferences abroad.	RDSO is the attached office of the Railway Ministry. All deputation of officers and staff to participate in seminars and conferences abroad are dealt with by the Ministry keeping in view the overall interest of the Railways as also the extant policy of the Government. Any deviation from the present policy is not considered necessary.
279	The RDSO should be free to create and fill up Ne posts required in connection with consultancy be work and debit the expenditure against the Ra fees recovered.	Not accepted. RDSO being an attached office cannot be treated at par with the Ministry or the Zonal Railways. It is not the policy to allow creation of posts by attached offices on the basis of such earnings as they have to fall in line with the overall pattern.
280	Research and Development Cells must be set up in Production Units and Major Workshops to review the processes, methods and materials for improving performance. The activities of these cells should be coordinated by the RDSO.	Research & Design activity on Indian Railways can be o divided into two broad groups, viz., (i) for the s manufacture of new Rolling Stock and (ii) as of applicable to maintenance technology. R & D activity applicable to new Rolling

		Stock has following facets: 1. Key designing and basic research 2. Detailed designing 3. Developmental Work for product improvement and Import substitution. Key designing and research are presently centralised in the RDSO. Lucknow, while detailed designing and developmental work are undertaken by respective Production Units. This system is considered quite satisfactory and no changes are considered necessary. However, barring sporadic efforts on Zonal Railways/Workshops, there is very little R & D activity applicable to maintenance of rolling stock. As suggested by the National Science and Technology Plan of the Ministry of Science and Technology to

		cover the long term requirements of the Railways, establishing of a separate Institute for Repair and Maintenance Technology was considered, but the Institute did not materialise due to paucity of funds. However, in view of the diverse technical, economic and personnel requirements of R & D activity/ Maintenance Technology, the Railways were of the view that this Institute should be a unit independent of RDSO, even though it will have to liaise with the RDSO and the Railways in its day-to-day activities. On receipt of an advice from the Mechanical Directorate, the work of setting up of Institute of Repair & Maintenance Technology at Gwalior on Central Railway had been accepted for inclusion in the FWP 1986-87 and central Railway had been asked to formulate the detailed proposals

		for inclusion of this work, the recommendation was implemented.
281	There should be greater integration and close co-operation between the RDSO and the Institutes of advanced training on the Railways, through exchange of visits, involvement of teaching faculty in research projects initiated by the RDSO.	This was already in vogue. However, instructions were the issued under Board's letter No.ERB-1/80/44/40 dated 14-3-1983.
282	The whole responsibility, jurisdiction and mutual relationship of the security agencies, namely Railway Protection Force, Government Railway Police and State Police, which are involved in safeguarding of railway property be examined with a view to ensuring optimum co-operation among them for preventing thefts and others forms of lawlessness.	The Action as suggested by Railway Accident Enquiry Committee was already being taken by the Railways.
283	Conditions must be created in which staff, even at junior levels will be encouraged to report the theft, without fear.	Instructions already exist. However, these were reiterated under Board's letter No.80/Sec.(Cr)/45/23 dated 19-6-1986.
284	Joint Control Centres be set up in	It was already an accepted policy of the

	cooperation with State Police, State Electricity Boards, Post & Telegraphs Deptt. for speedy action in the case of theft to OHE equipment and telephone wires, etc.	Railway Board and was being implemented, wherever e necessary. However, the instructions, issued to the Railways in this regard during July 1977 had been reiterated under Board's letter No.80/Sec. (Cr.)/45/24dated 20-2-1989.
285	Measures should be taken by the Railway Administrations in consultation with the RDSO to evolve equipment which will be difficult to a steal.	Noted. Necessary instructions were issued by RDSO to 50 Zonal Railways under their letter No.A/RAC-78 dated 25-7-1986 and under Board's letter No.83/Sec(Cr.)/45/6 dated 18-6-1986.
286	Efforts need to be made to educate the public C about the nature and consequences of miscreant activity through mass media. Appropriate institutional and procedural arrangements should be evolved.	Government had been making every effort to educate of the public through multi-media publicity highlighting the nature and consequences of miscreant activities affecting safety of train operations. This was a continuous process.
287	The Railway Board should take effective action T to overcome hurdles, if any, in bringing into force speedily the revised set of General Rules.	The new General Rules (1976) had been brought into force from 1-7-1983.
288(i)	Important rule books should be reprinted 2 periodically, say, once in 5 years or when	288(i) & (ii): Instructions already exist that when the there are more than five

	the number of correction slips exceeds 25.	correction slips to the Rules contained in a particular page of Rule Book, the Railway should reprint that particular page itself or alternatively when there are large number of corrections to the Rules contained in a particular chapter, that chapter itself should be reprinted. To facilitate this, Railways have been instructed that reprint of their rule books should be brought out in loose-bound form. In view of this position, there is no need to lay down a periodicity for printing the Rule Books.
(ii)	Issue of rule books in a loose leaf form should be also be considered.	
289	Rules must be drafted in simple language easily understood by staff. These should also be in the regional language, where necessary.	This was already the accepted practice.

290	A uniform procedure applicable to all the zonal railways should be devised by which the station working rules are reviewed and re- issued at regular intervals of 3 to 5 years (ii) Station working rules should be made into separate parts for the use of different categories of station staff.	(i) Necessary action had been taken. (ii) Not accepted.
291(i)	Greater care should be exercised in the correct Ac preparation of working time tables.	Accepted. Necessary instructions were issued under Board's letter No.83/TT(1)/86/1 dated 7-4-1983. Since implementation of this was of continuous process (WITs are prepared twice a year), the recommendation was treated as implemented.
(ii)	Working time tables should show inter- Ro sectional running time of trains in integers hig correct to a minute and not a fraction thereof.	Rounding off of running time of trains to the next s higher integer would lead to increase in overall running time of trains in a section and this would have vital significance where fast trains are running. Therefore, this recommendation was not accepted.
292	Field telephones should be provided to the	In order to facilitate quicker

	guard of each goods train so that he can contact the station master on either side of the occupied section.	communication with the n control in the event of any accident etc. provision of portable telephones to the driver of each diesel Goods Trains is accepted and necessary instructions had been issued under Board's letter No.91/Tele/TN/14/RAEC dated 30-4-1991.
293	The display of the normal and reverse positions of the facing points on indicators in the station master's office should be arranged.	Not accepted. For normal signalled movement since the position of the facing points is detected, there is no need for giving indication in the Station Master's Office. For other movements, since points are to be cotter bolted and padlocked by ASM, there is no need for provision of the indicators
294	A study should be made to determine the Me workload in hump yards beyond which the use pro of skids would become impractical and of mechanisation becomes necessary. In non-wo mechanised hump yards, skid porters should be provided in every sorting line.	Mechanisation of hump yards was selectively progressing according to the workload and availability of resources. There had been reduction in the workload of several marshalling yards over the last few years as a result of increase in block trains operating on the sections. Deployment of skid porters in marshalling

		yards was arranged in accordance with the workload determined from time to time and with full consciousness of the need to minimise damage to rolling stock and safety of operations. Necessary instructions were also issued under Board's letter No.83/Safety-1/9/Item-294 dated 19-7-1985.
295	The working time tables should show the time taken between successive signals by trains running at the restricted speed of 20 kmph after stopping at an automatic signal in 'ON' position.	It is difficult to set up a machinery to keep a record of the time taken by trains between successive signals in automatic signalling territories. Introduction of any procedure for this purpose would mean considerable input by way of additional staff without ensuring reliability and without commensurate advantage as the administration will still have to depend on the Drivers' version in regard to the time taken by the trains between successive signals.
296	The introduction of battery power operated tail lamps and hand signal lamps in lieu of	Accepted. Action had already been initiated in this direction. Later necessary

	oil lamps should be considered by the Railways.	instructions were issued under Board's letter No. 85/Safety-1/24/2 dated 17-11- 86 and 21-10-87 and recommendation treated as implemented.
297	The running of trains and pilots without brakevans should be curbed effectively by mitigating the chronic shortage of brakevans.	Instructions were issued under Board's letters No. 85- TTIV/86/1 dated 17-5-1983 and 18-5-1985.
298	Working conditions and facilities in cabins should be improved.	Accepted. Instructions had been issued to the Railways to improve working conditions and facilities in cabins.
299	In the case of staff connected with train passing duties, job analysis and work emp measurement according to modern industrial techniques must be undertaken to determine if any relief by way of additional strength or reduction in duty hours in warranted.	Accepted. In fact the provisions of the hours of employment Regulations already provide a machinery which is set in motion on receipt of requests on ground of increase in workload either from the employees concerned, or from recognised unions or from officers of the Central Industrial Relations Machinery by assessing their workload through job analysis and relief as due granted to them by reducing their duty hours by appointment of additional staff to the extent necessary.

		However, whenever there is violation of HOER, the matter is taken up by the officers of Central Industrial Relation Machinery and remedial action taken.
300	The Railway Administrations should take This effective remedial action to restore the faith of staff in the sanctity of rules and check the drift towards the adoption of short-cut methods and violation of rules.	This was already the accepted practice.
301	Hydraulic Buffers should be provided at dead ends on platform lines at terminal stations. A suitable design of a hydraulic buffer should be evolved speedily.	This recommendation had initially been accepted. However, this issue was re-examined and Board in its meeting held on 1-11-90 had decided to drop this item in view of the very high cost and high component of foreign exchange involved. Thus the recommendation was re-classified as not accepted.
302	Railway doctors should be given powers to hire Ins road transport vehicles so that they may d proceed to the site of the accident by the quickest means.	Instructions issued under Board's letter No.80/H/7/2 dated 9-7-1980. Health Directorate considered the position satisfactory.
303(i)	For dealing with accidents involving gas	Gas masks had been made a standard

	cylinders, gas masks should be provided as a equipment of the accident relief train.	equipment in ART vide Board's letter No.80/M(M&P)/7/17 Pt-1 dated 17-8-82. Most of the Railways had taken action for its procurement.
(ii)	With the introduction of electric traction, it would be necessary to have more and more of hydraulic jacks or MFD equipment for re-railing operations.	Hydraulic re-railing equipment had been prescribed as a standard equipment on all A and B Class Accident Relief Trains. 48 sets of re-railing equipment had already been positioned on various railways. Tender for procurement of 60 more sets had been floated when the recommendation was treated implemented.
(iii)	With the introduction of heavier locomotives and wagons it is necessary to have more powerful cranes than at present.	Diesel crane of 140/150 tonnes capacity had been made a standard item of the ART on B.G. section. Order had been placed for import of 12 such cranes which were being procured along with the technology with a view to developing indigenous manufacture in the railway workshop. Similarly for M.G., a diesel crane of suitable capacity was under consideration when the recommendation was treated as implemented.

304	(i) t For improving the availability of stores, stores organisation should divisionalised.	(i) Divisionalisation of Stores had been accepted as a policy by the Board and was being implemented.
	(ii) Divisional Stores Officers should be brought under the direct control of the Divisional Railway Manager/Divisional Superintendent.	(ii) Same as in Item (i) above.
	(iii) The set up at the divisional level should be assigned the purchase functions in respect of such items for which supplies were obtainable from local sources, after it has been suitably strengthened.	(iii) Same as in Item (i) above.
	(iv) For undertaking the purchase function effectively adequate powers should be delegated to the Divisional Stores Officers and Divisional Railway Manager.	(iv) Same as in Item (i) above.
	(v) In the case of stores depots, which serve specified workshops, the Stores Officer should be placed under the control of the	(v) The policy was already in vogue. However, only a d very small number of the Stores Depots serve e workshop

	head of the workshop.	exclusively.
305	In matters pertaining to escalation as well as splitting up of the tendered quantity amongst more than one tenderer, the General Manager should have full powers.	The matter pertaining to escalation of prices had at that time been recently reviewed by the Government er at the highest level (through a committee of secretaries) and no further powers had been allowed. Railways, however, have full powers to place parallel orders for obtaining their requirements. Full powers had been given to General Managers for splitting up of tendered quantities (the limit of 10% as maximum differential between highest and lowest prices to be ordered had been withdrawn). Instructions had been issued under Board's letters No.76/RS(G)/779/36 dated 8-11-79 and 79/RS(G)/779/41 dated 26-10-80-implemented.
306	The procedure of risk purchase is not conducive to purchases. making quick alternate in the case of small value purchases, a penalty for default or forfeiture of the security deposit of the order and/or	Railways already have powers to waive risk purchases under mitigating circumstances up to Rs.25,000 and have also got powers to make emergency parallel purchases in case of failure of contracts.

	removal from the list of approved suppliers would be more appropriate than resorting to risk purchases.	Instructions were issued under Board's letter No.77/RS(G)/779/29 dated 23-5-83 (implemented).
307	A comprehensive list of safety items of stores pertaining to different departments should be drawn up and procurement of these items should be through limited tenders, only from established and proven manufacturers of such stores.	List of Safety items of different departments had already been drawn up and Railways had instructions to procure them only through limited tenders. Later, a revised list circulated to Railways and Production Units under Board's letters .68RS(G)/645/Pt. I Dated 26- 2-1986 & 9-9-1986.
308	The performance of the Stores department in the matter of inventory control should not be judged only on the value of the inventory at the end of the financial year but on the basis of the average value of inventory over the entire 12-month period.	The performance of the Stores Department is not judged only by the year ending inventory. Review throughout the year is made
309	Railway materials should be given highest priority for movement and should be exempted from all booking restrictions.	This was already being done. However, instructions were also issued under. Board's letter No.83/\Gamma\Gamma(1)/86/1 dated 7-4-1983
310	Modern materials management systems should be adopted on the Railways.	The administration is aware of this need and these concepts are being progressively

		introduced on the Railways right from the 1960s, e.g. computerisation of Stores Ledgers, re-components etc. As adoption of new techniques is an unending process, the recommendation was treated as implemented.

APPENDIX B

Annexure-1

NUMAER AND INCIDENCE OF COITSEQUENTIAL TRAIN ACCIDENTS OF AIL THE GAUGES COMBINED CORRELATED TO DENSITY OF TRAFFIC – RAILWAY-WISE; YEARWISE.

A = Number of accidents **B = Incidence of accidents per million train kilometres**

P – Passenger Trains **O – Other Trains**

Year	Railway	Collisions				Derailments				Accidents at Level Crossings			
1988-89		A			B	A			B	A			B
		P	O	T		P	O	T		P	O	T	
	CR	3	1	4	0.03	8	43	51	0.49	5	0	5	0.04
	ER	5	3	8	0.11	12	57	69	0.94	1	0	1	0.01
	NR	5	1	6	0.06	18	44	62	0.63	10	3	13	0.13
	NE	1	0	1	0.03	5	18	23	0.71	4	3	7	0.21
	NF	0	1	1	0	15	41	56	0	1	0	1	0
	SR	0	1	1	0.1	12	34	46	1.65	4	0	4	0.0009
	SC	3	1	4	0.06	3	34	37	0.56	6	1	7	0.11
	SE	0	2	2	0.03	7	59	66	1.1	4	6	10	0.17
	WR	1	2	3	0.03	4	43	47	0.53	6	1	7	0.08
	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	18	12	30	0.05	84	373	457	0.76	41	14	55	0.09

T = Total

Year	Railway	Fairs in Trains				All consequential Train Accidents			
1988-89		A			B	A			B
		P	O	T		P	O	T	
	CR	0	0	0	0	16	44	60	0.58
	ER	0	0	0	0	18	60	78	1.06
	NR	0	0	0	0	33	48	81	0.8
	NE	0	0	0	0	10	21	31	0.95
	NF	0	0	0	0	16	42	58	0
	SR	0	0	0	0	16	35	51	
	SC	1	0	1	0.02	13	36	49	0.74
	SE	0	0	0	0	11	67	78	1.3
	WR	2	0	2	0.02	13	46	59	0.66
	METRO	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0
	TOTAL	3	0	3	0.004	146	399	545	0.9

P – Passenger Trains **O – Other Trains**

Year	Railway	Collisions				Derailments				Accidents at Level Crossings			
1989-90		A			B	A			B	A			B
		P	O	T		P	O	T		P	O	T	
	CR	6	1	7	0.06	17	28	45	0.42	4	0	4	0.03
	ER	5	4	9	0.12	14	41	55	0.74	5	1	6	0.08
	NR	2	0	2	0.02	24	32	56	0.56	9	2	11	0.11
	NE	3	0	3	0.09	5	14	19	0.57	3	0	3	0.09
	NF	1	2	3	0.17	4	36	40	2.32	2	0	2	0.12
	SR	0	0	0	0	14	30	44	37.7	4	1	5	4.28
	SC	0	2	2	0.03	16	27	43	0.66	1	0	1	0.02
	SE	4	3	7	0.11	16	96	112	1.74	1	1	2	0.03
	WR	0	1	1	0.01	8	35	43	0.48	8	0	8	0.09
	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	21	13	34	0.05	118	339	457	0.74	37	5	42	0.07

T = Total

Year	Railway	Fairs in Trains				All consequential Train Accidents			
1989-90		A			B	A			B
		P	O	T		P	O	T	
	CR	1	0	1	0.01	28	29	57	0.53
	ER	0	0	0	0	24	46	70	0.94

	NR	1	0	1	0.01	36	34	70	0.69
	NE	1	0	1	0.03	12	14	26	0.78
	NF	1	0	1	0.06	8	38	46	2.67
	SR	0	0	0	0	18	31	49	57.2
	SC	1	0	1	0.02	18	29	47	0.72
	SE	1	0	1	0.01	22	100	122	1.9
	WR	2	0	2	0.02	18	36	54	0.6
	METRO	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0
	TOTAL	8	0	8	0.01	184	357	541	0.88

P – Passenger Trains **O – Other Trains**

Year	Railway	Collisions				Derailments				Accidents at Level Crossings			
1990-91		A			B	A			B	A			B
		P	O	T		P	O	T		P	O	T	
	CR	4	5	9	0.08	7	30	37	0.36	3	0	3	0.03
	ER	8	2	10	0.13	10	38	48	0.64	3	0	3	0.04
	NR	4	1	5	0.05	18	29	47	0.45	5	1	6	0.06
	NE	2	1	3	0.09	7	12	19	0.5	0	0	0	0
	NF	0	1	1	0.06	10	36	46	2.7	0	0	0	
	SR	2	2	4	4.94	5	54	59	72.9	8	1	9	11.12
	SC	2	1	3	0.04	12	41	53	0.79	1	0	1	0.01
	SE	0	4	4	0.06	10	87	97	1.46	6	3	9	0.13
	WR	1	1	2	0.02	12	27	39	0.43	6	0	6	0.07

	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	23	18	41	0.07	91	354	445	0.72	32	5	37	0.06

T = Total

Year	Railway	Fairs in Trains				All consequential Train Accidents			
1990-91		A			B	A			B
		P	O	T		P	O	T	
	CR	1	0	1	0.01	15	35	50	0.48
	ER	1	0	1	0.01	22	40	62	0.82
	NR	2	0	2	0.02	29	31	60	0.52
	NE	0	0	0	0	9	13	22	0.06
	NF	0	0	0		10	37	47	2.75
	SR	0	0	0	0	15	57	72	58.26
	SC	2	0	2	0.03	17	42	59	0.88
	SE	1	0	1	0.01	17	94	111	1.68
	WR	2	0	2	0.02	21	28	49	0.54
	METRO	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0
	TOTAL	9	0	9	0.01	155	377	532	0.86

P – Passenger Trains **O – Other Trains**

Year	Railway	Collisions				Derailments				Accidents at Level Crossings			
1991-92		A			B	A			B	A			B
		P	O	T		P	O	T		P	O	T	
	CR	2	1	3	0.03	11	32	43	0.41	5	1	6	0.05
	ER	4	2	6	0.08	9	38	47	0.62	2	0	2	0.02
	NR	3	2	5	0.05	13	33	46	0.42	3	0	3	0.03
	NE	1	0	1	0.03	4	8	12	0.08	9	1	10	0.3
	NF	1	1	2	0.11	13	35	48	2.69	2	0	2	0.11
	SR	0	0	0	0	13	65	78	122	10	1	11	17.25
	SC	3	2	5	0.07	19	36	55	0.79	2	0	2	0.03
	SE	3	3	6	0.08	30	257	287	4.04	3	1	4	0.06
	WR	1	1	2	0.02	9	30	39	0.42	5	3	8	0.08
	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	18	12	30	0.05	121	534	655	1.04	41	7	48	0.08

T = Total

Year	Railway	Fairs in Trains				All consequential Train Accidents			
1991-92		A			B	A			B
		P	O	T		P	O	T	
	CR	2	0	2	0.02	20	34	54	0.52
	ER	1	0	1	0.01	16	40	56	0.73

	NR	1	0	1	0.01	20	35	55	0.46
	NE	0	0	0		14	9	23	1.1
	NF	0	0	0	0	16	36	52	2.92
	SR	2	0	2	3.14	25	66	91	58.02
	SC	2	0	2	0.03	26	38	64	0.92
	SE	0	0	0	0	36	261	297	4.18
	WR	1	0	1	0.01	16	34	50	0.53
	METRO	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0
	TOTAL	9	0	9	0.01	189	553	742	1.18

P – Passenger Trains **O – Other Trains**

Year	Railway	Collisions				Derailments				Accidents at Level Crossings			
1992-93		A			B	A			B	A			B
		P	O	T		P	O	T		P	O	T	
	CR	2	7	9	0.08	13	23	36	0.34	5	1	6	0.05
	ER	5	2	7	0.09	14	21	35	0.45	3	0	3	0.04
	NR	5	3	8	0.08	25	95	120	1.13	21	4	25	0.24
	NE	1	0	1	0.03	13	14	27	0.8	10	0	10	0.3
	NF	0	0	0		18	32	50	2.93	0	0	0	
	SR	5	1	6	5.32	16	24	40	35.4	4	0	4	3.54
	SC	2	3	5	0.07	22	23	45	0.64	4	1	5	0.07
	SE	2	8	10	0.14	37	183	220	3.15	6	4	10	0.14
	WR	3	4	7	0.07	11	29	40	0.42	7	1	8	0.08
	METRO	0	0	0	0	0	0	0	0	0	0	0	0

	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	25	28	53	0.09	169	444	613	0.97	60	11	71	0.11

T = Total

Year	**Railway**	**Fairs in Trains**				**All consequential Train Accidents**			
1992-93		**A**			**B**	**A**			**B**
		P	O	T		P	O	T	
	CR	2	0	2	0.02	22	31	53	0.5
	ER	1	0	1	0.01	23	23	46	0.59
	NR	2	0	2	0.02	53	102	155	1.32
	NE	0	0	0	0	24	14	38	1.1
	NF	0	0	0		18	32	50	2.93
	SR	0	0	0	0	25	25	50	59.53
	SC	1	0	1	0.01	29	27	56	0.80
	SE	0	0	0	0	45	195	240	3.44
	WR	3	0	3	0.03	24	34	58	0.6
	METRO	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0
	TOTAL	9	0	9	0.01	263	483	746	1.18

P – Passenger Trains **O – Other Trains**

Year	Railway	Collisions				Derailments				Accidents at Level Crossings			
1993-94		A			B	A			B	A			B
		P	O	T		P	O	T		P	O	T	
	CR	3	3	6	0.1	6	35	41	0.4	4	0	4	0.03
	ER	4	6	10	0.1	16	21	37	0.5	10	0	0	
	NR	9	3	12	0.1	24	88	112	1.1	19	3	22	0.21
	NE	2	1	3	0.1	10	15	25	0.8	7	0	7	0.2
	NF	0	1	1	0.1	9	31	40	2.7	3	0	3	0.2
	SR	3	0	3	2.7	4	32	36	32	9	2	11	9.75
	SC	2	3	5	0.07	7	40	47	0.65	5	0	5	0.07
	SE	2	6	8	0.1	20	148	168	2.3	4	1	5	0.07
	WR	4	2	6	0.1	9	32	41	0.5	10	4	14	0.17
	METRO	0	0	0		0	0	0		0	0	0	
	KRC	0	0	0		0	0	0		0	0	0	
	TOTAL	29	25	54	0.1	105	442	547	0.9	61	10	71	0.11

T = Total

Year	Railway	Fairs in Trains				All consequential Train Accidents			
1993-94		A			B	A			B
		P	O	T		P	O	T	
	CR	0	0	0		13	38	51	0.47
	ER	0	0	0		20	27	47	0.61

	NR	1	0	1	0	53	94	147	1.28
	NE	0	0	0	0	19	16	35	1.1
	NF	1	0	1	0.1	13	32	45	2.99
	SR	0	0	0		16	34	50	57.95
	SC	0	0	0	0	14	43	57	0.79
	SE	1	0	1	0	27	155	182	2.47
	WR	0	0	0	0	23	38	61	0.73
	METRO	0	0	0		0	0	0	
	KRC	0	0	0		0	0	0	
	TOTAL	3	0	3	0.00	198	477	675	0.05

P – Passenger Trains **O – Other Trains**

Year	Railway	Collisions				Derailments				Accidents at Level Crossings			
1994-95		A			B	A			B	A			B
		P	O	T		P	O	T		P	O	T	
	CR	3	5	8	0.1	9	37	46	0.4	1	0	1	0.11
	ER	3	2	5	0.1	12	16	28	0.4	2	0	2	0.01
	NR	5	2	7	0.1	23	79	102	1	11	3	14	0.02
	NE	3	0	3	0.1	13	3	16	0.5	8	0	8	0.13
	NF	0	0	0		9	40	49	3.2	0	1	1	0.26
	SR	2	1	3	2.7	7	24	31	27	23	4	27	0.06
	SC	0	1	1	0.01	17	22	39	0.52	9	1	10	23.92
	SE	3	2	5	0.1	25	110	135	1.7	2	0	2	0.13
	WR	2	2	4	0	12	29	41	0.4	6	3	9	0.0.
	METRO	0	0	0		0	0	0		0	0	0	0.1

	KRC	0	0	0		0	0	0		0	0	0	
	TOTAL	21	15	36	0.1	127	360	487	0.8	62	12	74	0.11

T = Total

Year	**Railway**	**Fairs in Trains**				**All consequential Train Accidents**			
1994-95		**A**			**B**	**A**			**B**
		P	O	T		P	O	T	
	CR	1	0	1	0	14	42	56	1.05
	ER	0	0	0		17	18	35	0.53
	NR	1	0	1	0	40	84	124	0.43
	NE	1	0	1	0	25	3	28	1.08
	NF	0	0	0		9	41	50	0.93
	SR	1	0	1	0.9	33	29	62	3.24
	SC	0	0	0	0	26	24	50	60.09
	SE	2	0	2	0	32	112	144	0.67
	WR	0	0	0	0	20	34	54	1.82
	METRO	1	0	1	2.8	1	0	1	0.58
	KRC	0	0	0		0	0	0	2.8
	TOTAL	7	0	7	0	217	387	604	

P – Passenger Trains **O – Other Trains**

Year	Railway	Collisions				Derailments				Accidents at Level Crossings			
1995-96		A			B	A			B	A			B
		P	O	T		P	O	T		P	O	T	
	CR	3	1	4	0	12	31	43	0.4	5	1	6	0.05
	ER	2	4	6	0.1	11	13	24	0.3	2	0	2	0.02
	NR	3	0	3	0	15	36	51	0.5	13	2	15	0.14
	NE	2	0	2	0.1	12	9	21	0.7	5	0	5	0.16
	NF	0	0	0		7	13	20	1.2	2	1	3	0.19
	SR	1	2	3	2.7	10	25	35	31	14	0	14	12.4
	SC	1	2	3	0.04	11	16	27	0.37	8	3	11	0.15
	SE	0	4	4	0.1	24	60	84	1	3	1	4	0.05
	WR	2	2	4	0	9	22	31	0.3	6	3	9	0.09
	METRO	0	0	0		0	0	0		0	0	0	
	KRC	0	0	0		0	0	0		0	0	0	
	TOTAL	14	15	29	0	111	225	336	0.5	58	11	69	0.11

T = Total

Year	**Railway**	**Fairs in Trains**				**All consequential Train Accidents**			
1995-96		**A**			**B**	**A**			**B**
		P	O	T		P	O	T	
	CR	1	0	0	0	21	33	54	0.5
	ER	0	0	0		15	17	32	0.4
	NR	0	0	0	0	31	38	69	0.59

	NE	0	0	0	0	19	9	28	0.91
	NF	0	0	0		9	14	23	1.43
	SR	0	0	0		25	27	52	63.13
	SC	0	0	0	0	20	21	41	0.56
	SE	3	0	3	0	30	65	95	1.1
	WR	0	0	0	0	17	27	44	0.45
	METRO	2	0	2	3.6	2	0	2	3.6
	KRC	0	0	0		0	0	0	
	TOTAL	6	0	6	0.01	189	251	440	0.67

P – Passenger Trains **O – Other Trains**

Year	Railway	Collisions				Derailments				Accidents at Level Crossings			
1996-97		A			B	A			B	A			B
		P	O	T		P	O	T		P	O	T	
	CR	4	3	7	0.1	18	23	41	0.4	3	3	6	0.05
	ER	0	6	6	0.1	12	8	20	0.3	5	0	5	0.06
	NR	2	0	2	0	19	52	71	0.7	8	3	11	1.1
	NE	2	0	2	0.1	5	2	7	0.2	10	2	12	0.38
	NF	0	0	0		10	8	18	1.1	0	0	0	
	SR	0	0	0		4	25	29	26	10	1	11	9.75
	SC	0	1	1	0.01	10	21	31	0.41	8	2	10	0.13
	SE	0	3	3	0	19	55	74	0.8	3	2	5	
	WR	2	3	5	0.1	10	23	33	0.4	2	4	6	0.06
	METRO	0	0	0		1	0	1	1.4	0	0	0	0.06
	KRC	0	0	0		3	0	3		0	0	0	
	TOTAL	10	16	26	0	111	217	328	0.5	49	17	66	0.10

T = Total

Year	Railway	Fairs in Trains				All consequential Train Accidents			
1996-97		A			B	A			B
		P	O	T		P	O	T	
	CR	3	0	3	0	28	29	57	0.52
	ER	0	0	0		17	14	31	0.38
	NR	1	0	1	0	30	55	85	0.74
	NE	0	0	0	0	17	4	21	0.67
	NF	0	0	0		10	8	18	1.14
	SR	0	0	0		14	26	40	64.08
	SC	0	0	0	0	18	24	42	0.55
	SE	1	0	1	0	23	60	83	0.35
	WR	0	0	0	0	14	30	44	0.46
	METRO	1	0	1	1.4	2	0	2	2.8
	KRC	0	0	0		3	0	3	
	TOTAL	6	0	6	0	176	250	426	0.64

P – Passenger Trains **O – Other Trains**

Year	Railway	Collisions				Derailments				Accidents at Level Crossings			
1997-98		A			B	A			B	A			B
		P	O	T		P	O	T		P	O	T	
	CR	8	4	12	0.1	15	34	49	0.4	1	0	1	0.01
	ER	1	3	4	0.1	7	15	22	0.3	1	0	1	0.01

	NR	4	0	4	0	16	24	40	0.3	9	4	13	0.11
	NE	1	0	1	0	8	5	13	0.4	9	1	10	0.29
	NF	1	1	2	0.1	7	7	14	0.9	3	1	4	0.27
	SR	1	1	2	1.8	14	39	53	47	8	2	10	8.86
	SC	0	1	1	0.01	8	22	30	0.40	6	0	6	0.08
	SE	1	3	4		16	48	64		9	0	9	
	WR	1	4	5	0.1	12	14	26	0.3	10	1	11	0.12
	METRO	0	0	0		1	0	1	1.3	0	0	0	
	KRC	0	0	0		3	0	3		0	0	0	
	TOTAL	18	17	35	0.1	107	208	315	0.5	56	9	65	0.10

T = Total

Year	**Railway**	**Fairs in Trains**				**All consequential Train Accidents**			
1997-98		**A**			**B**	**A**			**B**
		P	O	T		P	O	T	
	CR	3	0	3	0	27	38	65	0.59
	ER	0	0	0		9	18	27	0.32
	NR	1	0	1	0	30	28	58	0.49
	NE	0	0	0	0	18	6	24	0.71
	NF	0	0	0		11	9	20	1.34
	SR	1	0	1	0.9	24	42	66	65.72
	SC	0	0	0	0	14	23	37	0.49
	SE	0	0	0		26	51	77	
	WR	0	0	0	0	23	19	42	0.45

	METRO	0	0	0		1	0	1	1.3
	KRC	0	0	0		3	0	3	
	TOTAL	5	0	5	0	186	234	420	0.62

Annexure – 2

GAUGE.WISE DISTRUBUTION OF NUMBER AND INCIDENCE OF CONSEQUENTIAL TRAIN ACCIDENTSCORRELATED TO DENSITY OF TRAFFIC RAILWAYWISE 8 GAUGEWISE IN FIVE.YEAR BLOCKS

A = Number of accidents **B = Incidence of accidents per million train kilometres**

PERIOD	Railway	Collisions						Derailments						Level crossings					
88-89 to 92-93		BG		MG		NG		BG		MG		NG		BG		MG		NG	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	CR	32	0.1	0	0	0	0	204	0.40	0	0	8	0.7	22	0	0	0	2	0.2
	ER	40	0.1	0	0	0	0	253	0.67	0	0	1	0.2	15	0	0	0	0	0
	NR	23	0.1	3	0.04	0	0	254	0.59	75	1	2	0.4	49	0.1	9	0.1	0	0
	NE	7	0.3	2	0.02	0	0	28	0.56	72	0.6	0	0	7	0.1	23	0.2	0	0
	NF	3	0.1	4	0.07	0	0	66	2.25	173	3	1	2.3	0	0	4	0.1	1	3.6
	SR	11	0.1	0	0	0	0	117	0.69	148	1.2	2	0.4	12	0.1	20	0.2	1	0
	SC	16	0.1	3	0.03	0	0	170	0.70	63	0.7	0	0	8	0	8	0.1	0	0
	SE	29	0.1	0	0	0	0	748	1.67	0	0	34	15	31	0.1	0	0	4	1.6
	WR	10	0	5	0.01	0	0	97	0.2	111	0.2	0	0	15	0	22	0	0	0
	METRO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	171	0.1	17	0.03	0	0	1937	0.80	642	1	48	1	159	0.1	86	0.1	8	0.2

PERIOD	Railway	Fires in trains						All consequential train accidents					
88-89 to 92-93		BG		MG		NG		BG		MG		NG	
		A	B	A	B	A	B	A	B	A	B	A	B
	CR	6	0	0	0	0	0	264	0.5	0	0	10	0.9
	ER	3	0	0	0	0	0	311	0.8	0	0	1	0.2
	NR	6	0	0	0	0	0	332	0.8	87	1.15	2	0.4
	NE	0	0	1	0	0	0	42	0.8	98	0.86	0	0
	NF	0	0	1	0	0	0	69	2.4	182	2.99	2	5.9
	SR	2	0	0	0	0	0	142	0.8	168	1.38	3	0.3
	SC	5	0	2	0	0	0	199	0.8	76	0.79	0	0
	SE	2	0	0	0	0	0	810	2.4	0	0	38	17
	WR	8	0	2	0	0	0	130	0.3	140	0.31	0	0
	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	32	0	6	0	0	0	2299	0.9	751	1.20	56	1.1

PERIOD	Railway	Collisions						Derailments						Level crossings					
93-94 to 97-98		BG		MG		NG		BG		MG		NG		BG		MG		NG	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	CR	37	0.1	0	0	0	0	220	0.41	0	0	0	0	15	0	0	0	3	0.3
	ER	31	0.1	0	0	0	0	130	0.33	0	0	1	0.2	10	0.1	0	0	0	0
	NR	26	0.1	2	0.08	0	0	341	0.71	30	0.08	5	1	70	0.1	5	0.1	0	0
	NE	8	0.1	3	0.03	0	0	42	0.65	40	0.4	0	0	22	0.3	20	0.3	0	0
	NF	2	0.1	1	0	0	0	97	2.54	43	1.1	1	2	5	0.2	6	0.2	0	0
	SR	9	0	2	0.04	0	0	149	0.67	35	0.4	0	0	37	0.4	34	0.4	2	0.4

	SC	11	0	0	0	0	0	150	0.47	24	0.4	0	0	36	0.1	6	0.1	0	0
	SE	24	0	0	0	0	0	515	1.02	0	0	10	5	22	0	0	0	3	1.4
	WR	20	0	4	0.01	0	0	136	0.25	36	0.1	0	0	25	0.1	24	0.1	0	0
	METRO	0	0	0	0	0	0	2	0.54	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	168	0.1	12	0.03	0	0	1788	0.64	208	0.5	17	0.4	242	0.1	95	0.2	8	0.2

PERIOD	**Railway**	**Fires in trains**						**All consequential train accidents**					
93-94 to 97-98		**BG**		**MG**		**NG**		**BG**		**MG**		**NG**	
		A	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	CR	8	0	0	0	0	0	280	0.5	0	0	3	0.3
	ER	0	0	0	0	0	0	171	0.5	0	0	1	0.2
	NR	4	0	0	0	0	0	441	0.9	37	0.97	5	1
	NE	0	0	1	0	0	0	72	1	64	0.72	0	0
	NF	1	0	0	0	0	0	105	2.8	50	0.92	1	2
	SR	1	0	1	0	0	0	196	0.9	72	0.8	2	0.4
	SC	0	0	0	0	0	0	197	0.6	30	0.56	0	0
	SE	7	0.2	0	0	0	0	568	102	0	0	13	6.3
	WR	0	0	0	0	0	0	181	0.4	64	0.14	0	0
	METRO	4	1.6	0	0	0	0	6	2.1	0	0	0	0
	KRC	0	0	0	0	0	0	6	0	0	0	0	0
	TOTAL	25	0	2	0	0	0	2223	0.8	317	0.74	25	0.6

Annexure -3

NUMBER AND INCIDENCE OF COLUSIONS ON INDIAN RAILWAYS CORRELATEDTO DENSITY OF TRAFNC - RAILWAY-WISE & GAUGE-MSE, IN 5-YEAR BLOCKS

A = Number of accidents **B = Incidence of accidents per million train kilometres**

PERIOD	**Railway**		**Number of Collisions**			
88-89 to 92-93			**BG**	**MG**	**NG**	**TOTAL**
	CR		32	0	0	32
	ER		40	0	0	40
	NR		23	3	0	26
	NE		7	2	0	9
	NF		3	4	0	7
	SR		11	0	0	11
	SC		16	3	0	19
	SE		29	0	0	29
	WR		10	5	0	15
	METRO		0	0	0	0
	KRC		0	0	0	0
	TOTAL	A	171	17	0	188
		B	0.07	0.03	0	0.06
PERIOD	**Railway**		**Number of Collisions**			
93-94 to 97-98			**BG**	**MG**	**NG**	**TOTAL**
	CR		37	0	0	37
	ER		31	0	0	31
	NR		26	2	0	28

	NE		8	3	0	11
	NF		2	1	0	3
	SR		9	2	0	11
	SC		11	0	0	11
	SE		24	0	0	24
	WR		20	4	0	24
	METRO		0	0	0	0
	KRC		0	0	0	0
	TOTAL	A	168	12	0	180
		B	0.06	0.03	0	0.05

Annexure -4

Number and incidence of collisions on Broad Gauge, Metre Gauge & Naro' Gauge separately for passenger and other trains - Railway-wise; Year-wise

A = Number of Collisions **B = incidence of collisions per million passenger/other train kilometres**

PERIOD	Railway	Passenger trains								Other trains							
		BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
1988-89		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	CR	3	0.05	0		0		3	0.05	1	0.02	0		0		1	0.02
	ER	5	0.12	0		0		5	0.12	3	0.01	0		0		3	0.01
	NR	4	0.09	1	0.1	0		5	0.09	1	0.03	0		0		1	0.03
	NE	0		1	0.05	0		1	0.05	0		0		0		0	
	NF	0		0		0		0		0		1	0.19	0		1	0.13
	SR	0		0		0		0		1		0		0		1	
	SC	2		1	0.042	0		3	0.06	1	0.1	0	0.0			1	0.1
	SE	0	0.01	0		0		0		2	0.04	0		0		2	0.04
	WR	0		1	0.01	0		1	0.01	2	0.02	0		0		2	0.02
	METRO	0		0		0		0		0		0		0		0	
	KRC	0		0		0		0		0		0		0		0	
	TOTAL	14	0.05	4	0.05	0		18	0.05	11	0.05	1	0.02	0		12	0.05

PERIOD	Railway	Gauge-wise total of (A)&(B) for						Grand TOTAL	
1988-89		Passenger and other trains						BG, MG, and NG	
		BG		MG		NG			
		A	B	A	B	A	B	A	B
	CR	4	0.04	0		0		4	0.04
	ER	8	011	0		0		8	0.11
	NR	5	0.1	1	0.07	0		6	0.06
	NE	0		1	0.05	0		1	0.05
	NF	0		1	0.09	0		1	0.06
	SR	1	0.01	0		0		1	0.01
	SC	3	0.1	1	0.0			4	0.06
	SE	2	0.04	0		0		2	0.04
	WR	2	0	1	0.01	0		3	0.03
	METRO	0		0		0		0	
	KRC	0		0		0		0	
	TOTAL	25	0.05	5	0.04	0		30	0.05

PERIOD	Railway	Passenger trains								Other trains							
1989-90		BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	CR	6	0.09	0	0.05	0		6	0.09	1	0.02	0		0		1	0.02
	ER	5	0.11	0		0		5	0.11	4	0.13	0		0		4	0.13

	NR	2	0.04	0		0		2	0.03	0		0		0		0	
	NE	3	0.44	0		0		3	0.44	0		0		0		0	
	NF	1	0.30	0	0.00	0		1	0.10	0		2	0.37	0		2	
	SR	0		0		0		0		0		0		0		0	
	SC	0	0.0	0 0	0			0	0	2	0.1	0	0.0	0		2	0.1
	SE	4	0.25	0		0		4	0.25	3	0.06	0		0		3	0.06
	WR	0		0		0		0		0		1	0.01	0		1	0.01
	METRO	0		0		0		0		0		0		0		0	
	KRC	0		0		0		0		0		0		0		0	
	TOTAL	21	0.08	0		0		21	0.06	10	0.05	3	0.07	0		13	0.05

PERIOD	**Railway**	**Gauge-wise total of (A)&(B) for**						**Grand TOTAL**	
1989-90		**Passenger and other trains**						**BG, MG, and NG**	
		BG		**MG**		**NG**			
		A	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	CR	7	0.07		0		0	7	0.07
	ER	9	0.12		0		0	9	0.12
	NR	2	0		0		0	2	0.02
	NE	3	0.44		0		0	3	0.44
	NF	1	0.17		2	0.09	0	3	0.17
	SR	0			0		0	0	
	SC	2	0.1		0	0.0		2	0.03
	SE	7	0.11		0		0	7	0.11
	WR	0			1	0.01	0	1	0.01
	METRO	0			0		0	0	

	KRC	0			0		0	0	
	TOTAL	31	0.06		3	0.02	0	34	0.05

PERIOD	Railway	Passenger trains								Other trains							
		BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
1990-91		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	CR	4	0.06	0		0		4	0.06	5	0.13	0		0		5	0.13
	ER	8	0.18	0		0		8	0.18	2	0.07	0		0		2	0.07
	NR	3	0.06	1	0.11			4	0.07	1	0.03	0		0		1	0.02
	NE	2	0.27	0		0		2	0.27	1	0.39	0		0		1	0.39
	NF	0		0		0		0		1	0.40	0		0		1	0.12
	SR	2		0		0		2	0.05	2		0		0		2	0.12
	SC	1	0.0	1	0.041			2	0.04	1	0.1	0	0.0			1	0.1
	SE	0		0		0		0		4	0.08	0		0		4	0.08
	WR	1	0.01	0		0		1	0.01	1	0.01	0		0		1	0.01
	METRO	0		0		0		0		0		0		0		0	
	KRC	0		0		0		0		0		0		0		0	
	TOTAL	21	0.08	2	0.02	0		23	0.06	18	0.05	0		0		18	0.07

PERIOD	Railway	Gauge-wise total of (A)&(B) for						Grand TOTAL	
1990-91		Passenger and other trains						BG, MG, and NG	
		BG		MG		NG			
		A	B	A	B	A	B	A	B
	CR	9	0.09	0		0		9	0.09
	ER	10	0.13	0		0		10	0.13
	NR	4	0.1	1	0.07	0		5	0.05
	NE	3	0.30	0		0		3	0.09
	NF	1	0.17	0		0		1	0.06
	SR	4	0.10	0		0		4	0.10
	SC	2	0.1	1	0.0	0		3	0.04
	SE	4	0.08	0		0		4	0.08
	WR	2	0	0		0		2	0.02
	METRO	0		0		0		0	
	KRC	0		0		0		0	
	TOTAL	39	0.08	2	0.15	0		41	0.07

PERIOD	Railway	Passenger trains								Other trains							
1991-92		BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	CR	2	0.03	0		0		2	0.03	1	0.03	0		0		1	0.03
	ER	4	0.09	0		0		4	0.09	2	0.07	0		0		2	0.07
	NR	2	0.04	1	0.1	0		3	0.05	2	0.05	0		0		2	0.04
	NE	1		0		0		1		0		0		0		0	

	NF	1	0.029	0		0		1	0.11	0		1	0.18	0		1	0.12
	SR	0		0		0		0		0		0		0		0	
	SC	2	0.1	1	0.04			3	0.06	2	0.1	0	0.0			2	0.1
	SE	3	0.17	0		0		3	0.17	3	0.05	0		0		3	0.05
	WR	0		1	0.01	0		1	0.01	1	0.01	0		0		1	0.01
	METRO	0		0		0		0		0		0		0		0	
	KRC	0		0		0		0		0		0		0		0	
	TOTAL	15	0.05	3	0.03	0		18	0.05	11	0.05	1	0.02	0		12	0.05

PERIOD	**Railway**	**Gauge-wise total of (A)&(B) for**						**Grand TOTAL**	
1991-92		**Passenger and other trains**						**BG, MG, and NG**	
		BG		**MG**		**NG**			
		A	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	CR	3	0.03	0		0		3	0. 03
	ER	6	0.08	0		0		6	0.08
	NR	4	0	1	0.06	0		5	0.05
	NE	1		0		0		1	
	NF	1	0.16	1	0.09	0		2	0.11
	SR	0		0		0		0	
	SC	4	0.1	1	0.0			5	0.07
	SE	6	0.08	0		0		6	0.08
	WR	1	0	1	0.01	0		2	0.02
	METRO	0		0		0		0	
	KRC	0		0		0		0	
	TOTAL	26	0.05	4	0.03	0		0	

PERIOD	Railway	Passenger trains								Other trains							
1992-93		BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	CR	2	0.03	0		0		2	0.03	7	0.18	0		0		7	0.18
	ER	5	0.11	0		0		5	0.11	2	0.06	0		0		2	0.06
	NR	5	0.1	0		0		5	0.08	3	0.08	0		0		3	0.07
	NE	0		1		0		1		0		0		0		0	
	NF	0		0		0		0		0		0		0		0	
	SR	5		0		0		5	0.12	1		0		0		1	0.06
	SC	2	0.1	0	0			2	0.04	3	0.2	0	0.0			3	0.2
	SE	2	0.14	0		0		2	0.13	8	0.14	0		0		8	0.14
	WR	2	0.02	1	0.01	0		3	0.03	3	0.03	1	0.01	0		4	0.04
	METRO	0		0		0		0		0		0		0		0	
	KRC	0		0		0		0		0		0		0		0	
	TOTAL	23	0.08	2	0.02	0		25	0.07	27	0.13	1	0.02	0		28	0.11

PERIOD	Railway	Gauge-wise total of (A)&(B) for Passenger and other trains						Grand TOTAL BG, MG, and NG	
1991-92		BG		MG		NG			
		A	B	A	B	A	B	A	B
	CR	9	0.09	0		0		9	0.09
	ER	7	0.09	0		0		7	0.09
	NR	8	0.1	0		0		8	0.08
	NE	0		1		0		1	

	NF	0		0		0		0	
	SR	6	0.20	0		0		6	0.20
	SC	5	0.1		0.0			5	0.07
	SE	10	0.14	0		0		10	0.14
	WR	5	0.1	2	0.02	0		7	0.07
	METRO	0		0		0		0	
	KRC	0		0		0		0	
	TOTAL	50	0.10	3	0.02	0		53	0.08

Year	Railway	Passenger trains								Other trains							
1993-94		BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	CR	3	0.04	0		0		3	0.04	3	0.08	0		0		3	0.08
	ER	4	0.09	0		0		4	0.09	6	0.21	0		0		6	0.21
	NR	8	0.15	1	0.13	0		9	0.15	3	0.08	0		0		3	0.07
	NE	1	0.27	1	0.06	0		2	0.11	1	0.35	0		0		1	0.35
	NF	0		0		0		0		1	0.40	0		0		1	0.15
	SR	3		0		0		3	0.07	0		0		0		0	
	SC	2	0.1	0	0			2	0.04	3	0.3	0	0.0			3	0.2
	SE	2	0.12	0		0		2	0.11	6	0.10	0		0		6	0.10
	WR	4	0.04	0		0		4	0.04	2	0.02	0		0		2	0.02
	METRO	0		0		0		0		0		0		0		0	
	KRC	0		0		0		0		0		0		0		0	
	TOTAL	27	0.09	2	0.02	0		29	0.07	25	0.11	0		0		25	0.10

PERIOD	Railway	Gauge-wise total of (A)&(B) for Passenger and other trains						Grand TOTAL BG, MG, and NG	
		BG		MG		NG			
1993-94		A	B	A	B	A	B	A	B
	CR	6	0.06	0		0		6	0.06
	ER	10	0.13	0		0		10	0.13
	NR	11	0.1	1	0.08	0		12	0.11
	NE	2	0.31	1	0.05	0		3	0.11
	NF	1	0.16	0		0		1	0.07
	SR	3	0.01	0		0		3	0.01
	SC	5	0.1		0.0			5	0.07
	SE	8	0.10	0		0		8	0.11
	WR	6	0.1	0		0		6	0.06
	METRO	0		0		0		0	
	KRC	0		0		0		0	
	TOTAL	52	0.10	2	0.02	0		54	0.08

Year	Railway	Passenger trains								Other trains							
		BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
1994-95		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	CR	3	0.04	0		0		3	0.04	5	0.14	0		0		5	0.14
	ER	3	0.06	0		0		3	0.06	2	0.06	0		0		2	0.06
	NR	5	0.09	0		0		5	0.08	2	0.05	0		0		2	0.05
	NE	1	0.09	2	0.13	0		3	0.12	0		0		0		0	
	NF	0		0		0		0		0		0		0		0	
	SR	2		0		0		2	0.04	1		0		0		1	0.07
	SC	0	0.0	0	0			0	0	1	0.1	0	0.0			1	0.1

	SE	3	0.16	0		0		3	0.15	2	0.03	0		0		2	0.03
	WR	1	0.01	1	0.01	0		2	0.02	1	0.01	1	0.01	0		2	0.02
	METRO	0		0		0		0		0		0		0		0	
	KRC	0		0		0		0		0		0		0		0	
	TOTAL	18	0.06	3	0.04	0		21	0.05	14	0.06	1	0.03	0		15	0.06

PERIOD	**Railway**	**Gauge-wise total of (A)&(B) for Passenger and other trains**						**Grand TOTAL BG, MG and NG**	
1994-95		**BG**		**MG**		**NG**			
		A	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	CR	8	0.08	0		0		8	0.08
	ER	5	0.06	0		0		5	0.06
	NR	7	0.1	0		0		7	0.07
	NE	1	0.07	2	0.11	0		3	0.09
	NF	0		0		0		0	
	SR	3	0.01	0		0		3	0.01
	SC	1	0.0		0.0			1	0.01
	SE	5	0.06	0		0		5	0.06
	WR	2	0	2	0.02	0		4	0.04
	METRO	0		0		0		0	
	KRC	0		0		0		0	
	TOTAL	32	0.06	4	0.04	0		36	0.06

Year	Railway	Passenger trains								Other trains							
1995-96		BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	CR	3	0.04	0		0		3	0.04	1	0.03	0		0		1	0.03
	ER	2	0.04	0		0		2	0.04	4	0.13	0		0		4	0.13
	NR	3	0.05	0		0		3	0.05	0		0		0		0	
	NE	2	0.18	0		0		2	0.18	0		0		0		0	
	NF	0		0		0		0		0		0		0		0	
	SR	1		0		0		1	0.02	1		1	1.0	0		2	0.85
	SC	1	0.0	0	0			1	0.02	2	0.3	0	0.0			2	0.3
	SE	0		0		0		0		4	0.06	0		0		4	0.06
	WR	2	0.02	0		0		2	0.02	1	0.01	1	0.01	0		2	0.02
	METRO	0		0		0		0		0		0		0		0	
	KRC	0		0		0		0		0		0		0		0	
	TOTAL	14	0.04	0		0		14	0.03	13	0.06	2	0.10	0		15	0.06

PERIOD	Railway	Gauge-wise total of (A)&(B) for Passenger and other trains						Grand TOTAL BG, MG, and NG	
		BG		MG		NG			
1995-96		A	B	A	B	A	B	A	B
	CR	4	0.04	0		0		4	0.04
	ER	6	0.07	0		0		6	0.07
	NR	3	0	0		0		3	0.03
	NE	2	0.13	0		0		2	0.06
	NF	0		0		0		0	
	SR	2		1	0.01	0		3	0.01
	SC	3	0.1		0.0			3	0.04

	SE	4	0.04	0		0		4	0.05
	WR	3	0	1	0.01	0		4	0.04
	METRO	0		0		0		0	
	KRC	0		0		0		0	
	TOTAL	27	0.05	2	0.02	0		29	0.04

PERIOD	**Railway**	**Gauge-wise total of (A)&(B) for Passenger and other trains**						**Grand TOTAL BG, MG and NG**	
1996-97		**BG**		**MG**		**NG**			
		A	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	CR	7	0.06	0		0		7	0.06
	ER	6	0.08	0		0		6	0.08
	NR	1	0	1	0.33	0		2	0.02
	NE	2	0.12	0		0		2	0.06
	NF	0		0		0		0	
	SR	0		0		0		0	
	SC	1	0.0		0.0			1	0.01
	SE	3	0.03	0		0		3	0.03
	WR	5	0.1	0		0		5	0.05
	METRO	0		0		0		0	
	KRC	0		0		0		0	
	TOTAL	25	0.04	1	0.01	0		26	0.04

Year	Railway	Passenger trains								Other trains							
1997-98		BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	CR	8	0.11	0		0		8	0.11	4	0.12	0		0		4	0.12
	ER	1	0.02	0		0		1	0.02	3	0.09	0		0		3	0.09
	NR	4	0.06	0		0		4	0.06	0		0		0		0	
	NE	1	0.07	0		0		1	0.03	0		0		0		0	
	NF	0		1	0.30	0		1	0.11	1	0.24	0		0		1	0.17
	SR	0		1	0.30	0		1	0.02	1		0		0		1	0.07
	SC	0	0.0	0	0			0	0	1	0.2	0	0.0			1	0.2
	SE	1		0		0		1		3		0		0		3	
	WR	1	0.01	0		0		1	0.01	3	0.03	1	0.01	0		4	0.04
	METRO	0		0		0		0		0		0		0		0	
	KRC	0		0		0		0		0		0		0		0	
	TOTAL	16	0.04	2	0.03	0		18	0.04	16	0.06	1	0.08	0		17	0.07

PERIOD	Railway	Gauge-wise total of (A)&(B) for Passenger and other trains						Grand TOTAL BG, MG and NG	
1996-97		BG		MG		NG			
		A	B	A	B	A	B	A	B
	CR	12	0.11	0		0		12	0.11
	ER	4	0.05	0		0		4	0.05
	NR	4	0	0		0		4	0.03
	NE	1	0.05	0		0		1	0.02
	NF	1	0.10	1	0.20	0		2	0.13
	SR	1		1	0.01	0		2	0.01
	SC	1	0.0		0.0			1	0.01

	SE	4		0		0		4	
	WR	4	0	1	0.01	0		5	0.05
	METRO	0		0		0		0	
	KRC	0		0		0		0	
	TOTAL	32	0.05	3	0.04	0		35	0.05

Annexure – 5

Types of collisions - Railway-wise, Gauge-wise in five-year blocks

Number of Collisions													
PERIOD	**Railway**	**Between two trains Including**				**Between a train and shunting**				**Between a train and rake or load**			
1988-89 to 1992-93		**Between a train and a light engine**				**Engine or vehicles during shunting**				**Or vehicles stabled on running line**			
		BG	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
	CR	26	0	0	26	2	0	0	2	2	0	0	2
	ER	38	0	0	38	0	0	0	0	0	0	0	0
	NR	10	2	0	12	3	1	0	4	5	0	0	5
	NE	6	2	0	8	0	0	0	0	1	0	0	1
	NF	3	3	0	6	0	0	0	0	0	1	0	1
	SR	10	0	0	10	1	0	0	1	0	0	0	0
	SC	14	3	0	17	0	0	0	0	2	0	0	2
	SE	20	0	0	20	1	0	0	1	0	0	0	0
	WR	9	3	0	12	0	0	0	0	1	0	0	1
	METRO	0	0	0	0	0	0	0	0	0	0	0	0

	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	136	13	0	149	7	1	0	8	11	1	0	12

Number of Collisions													
PERIOD	**Railway**	**Between a train or a**				**Between a train and buffer ends**				**Total of all types**			
		Trolley or lorry				**Or other stationary objects**							
		BG	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
1988-89 to 1992-93	CR	1	0	0	1	1	0	0	1	32	0	0	32
	ER	2	0	0	2	0	0	0	0	40	0	0	40
	NR	0	0	0	0	5	0	0	5	23	3	0	26
	NE	0	0	0	0	0	0	0	0	7	2	0	9
	NF	0	0	0	0	0	0	0	0	3	4	0	7
	SR	0	0	0	0	0	0	0	0	11	0	0	11
	SC	0	0	0	0	0	0	0	0	16	3	0	19
	SE	1	0	0	1	7	0	0	7	29	0	0	29
	WR	0	2	0	2	0	0	0	0	10	5	0	15
	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	4	2	0	6	13	0	0	13	171	17	0	188

Number of Collisions													
PERIOD	**Railway**	**Between a train or a**				**Between a train and buffer ends**				**Total of all types**			
193-94 to 1997-98		**Trolley or lorry**				**Or other stationary objects**							
		BG	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
	CR	33	0	0	33	0	0	0	0	4	0	0	4
	ER	24	0	0	24	6	0	0	6	1	0	0	1
	NR	20	0	0	20	2	2	0	4	0	0	0	0
	NE	6	1	0	7	2	1	0	3	0	1	0	1
	NF	2	1	0	3	0	0	0	0	0	0	0	0
	SR	9	2	0	11	0	0	0	0	0	0	0	0
	SC	11	0	0	11	0	0	0	0	0	0	0	0
	SE	22	0	0	22	0	0	0	0	0	0	0	0
	WR	16	3	0	19	2	1	0	3	2	0	0	2
	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	143	7	0	150	12	4	0	16	7	1	0	8

Number of Collisions													
PERIOD	**Railway**	**Between a train or a**				**Between a train and buffer ends**				**Total of all types**			
193-94 to 1997-98		**Trolley or lorry**				**Or other stationary objects**							
		BG	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
	CR	0	0	0	0	0	0	0	0	37	0	0	37
	ER	0	0	0	0	0	0	0	0	31	0	0	31
	NR	4	0	0	4	0	0	0	0	26	2	0	28
	NE	0	0	0	0	0	0	0	0	8	3	0	11
	NF	0	0	0	0	0	0	0	0	2	1	0	3
	SR	0	0	0	0	0	0	0	0	9	2	0	11
	SC	0	0	0	0	0	0	0	0	11	0	0	11
	SE	2	0	0	2	0	0	0	0	24	0	0	24
	WR	0	0	0	0	0	0	0	0	20	4	0	24
	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	6	0	0	6	0	0	0	0	168	12	0	180

Annexure – 6

Types of Collisions on all gauges combined - Railway-wise separately for passenger and other trains in five-year blocks

Number of Collisions										
PERIOD	**Railway**	**Between two trains Including Between a train and a light engine**			**Between a train and shunting Engine or vehicles during shunting**			**Between a train and rake or load Or vehicles stabled on running line**		
1988-89 to 1992-93		**Passenger Train**	**other Train**	**TOTAL**	**Passenger Train**	**other Train**	**TOTAL**	**Passenger Train**	**other Train**	**TOTAL**
	CR	13	13	26	2	0	2	0	2	2
	ER	26	12	38	0	0	0	0	0	0
	NR	11	1	12	3	1	4	2	3	5
	NE	8	0	8	0	0	0	0	1	1
	NF	2	4	6	0	0	0	0	1	1
	SR	7	3	10	0	1	1	0	0	0
	SC	9	8	17	0	0	0	1	1	2
	SE	7	13	20	0	1	1	0	0	0
	WR	5	7	12	0	0	0	0	1	1
	METRO	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	TOTAL	88	61	149	5	3	8	3	9	12

Number of Collisions										
PERIOD	**Railway**	**Between a train or a Trolley or lorry**			**Between a train and buffer ends Or other stationary objects**			**Total of all types**		
1988-89 to 1992-93		**Passenger Train**	**other Train**	**TOTAL**	**Passenger Train**	**other Train**	**TOTAL**	**Passenger Train**	**other Train**	**TOTAL**
	CR	1	0	1	1	0	1	17	15	32
	ER	1	1	2	0	0	0	27	13	40
	NR	0	0	0	3	2	5	19	7	26
	NE	0	0	0	0	0	0	8	1	9
	NF	0	0	0	0	0	0	2	5	7
	SR	0	0	0	0	0	0	7	4	11
	SC	0	0	0	0	0	0	10	9	19
	SE	0	1	1	2	5	7	9	20	29
	WR	1	1	2	0	0	0	6	9	15
	METRO	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	TOTAL	3	3	6	6	7	13	105	83	188

Number of Collisions										
PERIOD	**Railway**	**Between two trains Including Between a train and a light engine**			**Between a train and shunting Engine or vehicles during shunting**			**Between a train and rake or load Or vehicles stabled on running line**		
193-94 to 1997-98		**Passenger Train**	**other Train**	**TOTAL**	**Passenger Train**	**other Train**	**TOTAL**	**Passenger Train**	**other Train**	**TOTAL**
	CR	18	15	33	0	0	0	3	1	4
	ER	9	18	27	1	2	3	0	1	1
	NR	15	5	20	4	0	4	0	0	0
	NE	6	1	7	3	0	3	1	0	1
	NF	1	2	3	0	0	0	0	0	0
	SR	7	4	11	0	0	0	0	0	0
	SC	3	8	11	0	0	0	0	0	0
	SE	6	16	22	0	0	0	0	0	0
	WR	11	7	18	0	4	4	0	2	2
	METRO	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	TOTAL	76	76	152	8	6	14	4	4	8

Number of Collisions										
PERIOD	**Railway**	**Between a train or a Trolley or lorry**			**Between a train and buffer ends Or other stationary objects**			**Total of all types**		
1988-89 to 1992-93		**Passenger Train**	**other Train**	**TOTAL**	**Passenger Train**	**other Train**	**TOTAL**	**Passenger Train**	**other Train**	**TOTAL**
	CR	0	0	0	0	0	0	21	16	37
	ER	0	0	0	0	0	0	10	21	31
	NR	4	0	4	0	0	0	23	5	28
	NE	0	0	0	0	0	0	10	1	11
	NF	0	0	0	0	0	0	1	2	3
	SR	0	0	0	0	0	0	7	4	11
	SC	0	0	0	0	0	0	3	8	11
	SE	0	2	2	0	0	0	6	18	24
	WR	0	0	0	0	0	0	11	13	24
	METRO	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	TOTAL	4	2	6	0	0	0	92	88	180

Annexure – 7

NATURE OF COLUSIONS ON ALL GAUGES SEPARATELY FOR PASSENGER AND OTHER TRAINS - RAILWAY.WISE IN 5-YEAR BLOCKS

A= Number of Collison **B = %age with respect to total of all types**

P = Passenger Trains **O = Other Trains**

Number of Collisions										
PERIOD	Railway		Head-on Collision			Rear-end Collision			Side Collision		
1988-89 to 1992-93			P	O	T	P	O	T	P	O	T
	CR		3	1	4	9	11	20	4	2	6
	ER		6	3	9	12	7	19	9	3	12
	NR		1	0	1	14	6	20	4	1	5
	NE		4	0	4	4	1	5	0	0	0
	NF		1	3	4	0	2	2	1	0	1
	SR		1	1	2	4	3	7	2	0	2
	SC		6	5	11	3	3	6	1	0	1
	SE		1	3	4	4	11	15	2	3	5
	WR		1	6	7	3	2	5	2	1	3
	METRO		0	0	0	0	0	0	0	0	0
	KRC		0	0	0	0	0	0	0	0	0
	TOTAL	A	24	22	46	53	46	99	25	10	35
		B	0.013	0.017	0.015	0.029	0.036	0.032	0.014	0.008	0.011

Number of Collisions								
PERIOD	Railway		Running over obstructions			Grand total of all types		
1988-89 to 1992-93			P	O	T	P	O	T
	CR		1	1	2	17	15	32
	ER		0	0	0	27	13	40
	NR		0	0	0	19	7	26
	NE		0	0	0	8	1	9
	NF		0	0	0	2	5	7
	SR		0	0	0	7	4	11
	SC		0	1	1	10	9	19
	SE		2	3	5	9	20	29
	WR		0	0	0	6	9	15
	METRO		0	0	0	0	0	0
	KRC		0	0	0	0	0	0
	TOTAL	A	3	5	8	105	83	188
		B	0.002	0.004	0.003	0.057	0.066	0.061

Number of Collisions										
PERIOD	**Railway**		**Head-on Collision**			**Rear-end Collision**			**Side Collision**		
1988-89 to 1992-93			**P**	**O**	**T**	**P**	**O**	**T**	**P**	**O**	**T**
	CR		1	2	3	11	8	19	9	5	14
	ER		0	4	4	6	13	19	4	4	8
	NR		2	1	3	15	1	16	1	2	3
	NE		4	0	4	6	1	7	0	0	0
	NF		0	1	1	0	0	0	1	1	2
	SR		3	1	4	1	2	3	2	0	2
	SC		0	3	3	0	5	5	2	0	2
	SE		0	9	9	3	8	11	3	1	4
	WR		2	3	5	6	8	14	3	2	5
	METRO		0	0	0	0	0	0	0	0	0
	KRC		0	0	0	0	0	0	0	0	0
	TOTAL	A	12	24	36	48	46	94	25	15	40
		B	0.006	0.019	0.011	0.024	0.036	0.029	0.012	0.012	0.012

Number of Collisions							
PERIOD	Railway	Running over obstructions			Grand total of all types		
1988-89 to 1992-93		P	O	T	P	O	T
	CR	0	1	1	21	16	37
	ER	0	0	0	10	21	31
	NR	5	1	6	23	5	28
	NE	0	0	0	10	1	11
	NF	0	0	0	1	2	3

	SR		1	1	2	7	4	11
	SC		1	0	1	3	8	11
	SE		0	0	0	6	18	24
	WR		0	0	0	11	13	24
	METRO		0	0	0	0	0	0
	KRC		0	0	0	0	0	0
	TOTAL	A	7	3	10	92	88	180
		B	0.003	0.002	0.003	0.046	0.070	0.055

Annexure-8

Cause-wise analysis of Collisions – Railway-wise Gauge-wise in five-year blocks

Number of Collisions													
PERIOD	**Railway**	**Reception of a train on blocked line or despatching into a blocked section**				**Drivers disregarding signals or falling to control trains**				**Reception on line fouled by vehicles from adjacent line**			
1988-89 to 1992-93		**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
	CR	3	0	0	3	19	0	0	19	0	0	0	0
	ER	20	0	0	20	19	0	0	19	0	0	0	0
	NR	3	0	0	3	16	3	0	19	1	0	0	1
	NE	0	0	0	0	7	2	0	9	0	0	0	0
	NF	1	0	0	1	2	3	0	5	0	0	0	0
	SR	3	0	0	3	6	0	0	6	0	0	0	0
	SC	0	1	0	1	11	1	0	12	0	0	0	0
	SE	4	0	0	4	11	0	0	11	3	0	0	0
	WR	0	0	0	0	9	4	0	13	0	0	0	0

	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	34	1	0	35	100	13	0	113	4	0	0	4

Number of Collisions													
PERIOD	**Railway**	**Derailed vehicle obstructing adjacent line in mid-section and train colliding with it**				**Unauthorised tampering with signal gear**				**Trollies or lorries not being protected**			
1988-89 to 1992-93		**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
	CR	0	0	0	0	0	0	0	0	1	0	0	1
	ER	0	0	0	0	0	0	0	0	0	0	0	0
	NR	1	0	0	1	0	0	0	0	0	0	0	0
	NE	0	0	0	0	0	0	0	0	0	0	0	0
	NF	0	1	0	1	0	0	0	0	0	0	0	0
	SR	0	0	0	0	1	0	0	1	0	0	0	0
	SC	0	0	0	0	0	0	0	0	0	0	0	0
	SE	0	0	0	0	3	0	0	3	1	0	0	1
	WR	0	0	0	0	0	0	0	0	0	0	0	0
	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	1	1	0	2	4	0	0	4	2	0	0	2

Number of Collisions									
PERIOD	Railway	Other Causes				Total of all causes			
1988-89 to 1992-93		BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	CR	9	0	0	9	32	0	0	32
	ER	1	0	0	1	40	0	0	40
	NR	2	0	0	2	23	3	0	26
	NE	0	0	0	0	7	2	0	9
	NF	0	0	0	0	3	4	0	7
	SR	1	0	0	1	11	0	0	11
	SC	5	1	0	6	16	3	0	19
	SE	7	0	0	7	29	0	0	29
	WR	1	1	0	2	10	5	0	15
	METRO	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0
	TOTAL	28	2	0	28	171	17	0	188

Number of Collisions													
PERIOD	**Railway**	**Reception of a train on blocked line or despatching into a blocked section**				**Drivers disregarding signals or falling to control trains**				**Reception on line fouled by vehicles from adjacent line**			
1993-94 to 1997-98		**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
	CR	3	0	0	3	23	0	0	23	4	0	0	4
	ER	11	0	0	11	19	0	0	19	0	0	0	0
	NR	7	0	0	7	12	0	0	12	0	0	0	0
	NE	2	2	0	4	6	1	0	7	0	0	0	0

	NF	1	0	0	1	1	0	0	1	0	1	0	1
	SR	2	0	0	2	4	2	0	6	0	0	0	0
	SC	1	0	0	1	6	0	0	6	1	0	0	1
	SE	4	0	0	4	11	0	0	11	0	0	0	0
	WR	0	0	0	0	18	4	0	22	0	0	0	0
	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	31	2	0	33	100	7	0	107	5	1	0	6

Number of Collisions													
PERIOD	**Railway**	**Derailed vehicle obstructing adjacent line in mid-section and train colliding with it**				**Unauthorised tampering with signal gear**				**Trollies or lorries not being protected**			
1993-94 to 1997-98		**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
	CR	2	0	0	2	0	0	0	0	0	0	0	0
	ER	0	0	0	0	0	0	0	0	0	0	0	0
	NR	0	0	0	0	0	0	0	0	4	0	0	4
	NE	0	0	0	0	0	0	0	0	0	0	0	0
	NF	0	0	0	0	0	0	0	0	0	0	0	0
	SR	1	0	0	1	1	0	0	1	0	0	0	0
	SC	1	0	0	1	0	0	0	0	0	0	0	0
	SE	0	0	0	0	0	0	0	0	1	0	0	1
	WR	1	0	0	1	0	0	0	0	0	0	0	0
	METRO	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	5	0	0	5	1	0	0	1	5	0	0	5

Number of Collisions									
PERIOD	**Railway**	**Other Causes**				**Total of all causes**			
1993-94 to 1997-98		**BG**	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
	CR	5	0	0	5	37	0	0	37
	ER	1	0	0	1	31	0	0	31
	NR	3	2	0	5	26	2	0	28
	NE	0	0	0	0	8	3	0	11
	NF	0	0	0	0	2	1	0	3
	SR	1	0	0	1	9	2	0	11
	SC	2	0	0	2	11	0	0	11
	SE	8	0	0	8	24	0	0	24
	WR	1	0	0	1	20	4	0	24
	METRO	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0
	TOTAL	21	2	0	23	168	12	0	180

Annexure-9

Categories of staff held responsible for Collisions - Gauge-wise, Railway wise in five-year blocks

PERIOD	Categories of staff held responsible	Gauge	Number of Staff held responsible for collisions					
			CR	ER	NR	NE	NF	SR
1988-89 to 1992-93	1- Station Masters, Asst. Station Masters, and Cabin Assistant Station Master	BG	11	15	5	1	1	1
		MG	0	0	2	0	1	0
		NG	0	0	0	0	0	0
		TOTAL	11	15	7	1	2	1
	2- Switchmen	BG	1	10	2	0	1	2
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	10	2	0	1	2
	3- Pointsmen	BG	5	0	0	0	0	1
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	5	0	0	0	0	1
	4-Levermen and Cabinmen	BG	3	9	2	0	1	1
		MG	0	0	1	0	0	0

		NG	0	0	0	0	0	0
		TOTAL	3	9	3	0	1	1
	5-Shunting Staff and other yard staff	BG	0	4	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	4	0	0	0	0
	6-Guards	BG	6	9	4	1	1	6
		MG	0	0	1	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	6	9	5	1	1	6
	7-Drivers	BG	24	27	20	7	2	9
		MG	0	0	2	2	3	0
		NG	0	0	0	0	0	0
		TOTAL	24	27	22	9	5	9
	8-Firemen/Assistant Drivers (Diesel and Electric)	BG	10	13	15	5	1	3
		MG	0	0	1	2	4	0
		NG	0	0	0	0	0	0
		TOTAL	10	13	16	7	5	3
	9-Shunters	BG	1	0	2	0	1	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	0	2	0	1	0

	10-Permanent Way Inspectors	BG	0	5	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	5	0	0	0	0
	11- Permanent Way Mistrys, Gangmates, Keymen &Gangmen	BG	1	3	2	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	3	2	0	0	0
	12-Loco Maintenance staff	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	13-Train examining staff and Carriage & Wagon maintenance staff	BG	0	2	2	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	2	2	0	0	0
	14-Signal Inspectors	BG	4	1	0	0	0	2
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	4	1	0	0	0	2
	15-Signal maintainers and other signalling staff	BG	2	1	1	0	1	0
		MG	0	0	0	0	0	0

		NG	0	0	0	0	0	0
		TOTAL	2	1	1	0	1	0
	16-Other staff like the Commercial Staff and electrical staff	BG	4	3	3	0	0	1
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	4	3	3	0	0	1
	17-TOTAL	BG	72	102	58	14	9	26
		MG	0	0	7	4	8	0
		NG	0	0	0	0	0	0
		TOTAL	72	102	65	18	17	26

PERIOD	**Categories of staff held responsible**	**Gauge**	**Number of Staff held responsible for collisions**					
			SC	**SE**	**WR**	**METRO**	**KRC**	**TOTAL**
1988-89 to 1992-93	1- Station Masters, Asst. Station Masters and Cabin Assistant Station Master	BG	1	0	1	0	0	36
		MG	3	0	0	0	0	6
		NG	0	0	0	0	0	0
		TOTAL	4	0	1	0	0	42
	2- Switchmen	BG	0	0	1	0	0	16
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	1	0	0	16

	3- Pointsmen	BG	1	0	0	0	0	7
		MG	3	0	0	0	0	6
		NG	0	0	0	0	0	0
		TOTAL	4	0	0	0	0	13
	4-Levermen and Cabinmen	BG	0	0	1	0	0	16
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	0	0	1	0	0	17
	5-Shunting Staff and other yard staff	BG	0	0	0	0	0	5
		MG	0	0	0	0	0	2
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	7
	6-Guards	BG	3	0	1	0	0	30
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	3	0	1	0	0	31
	7-Drivers	BG	14	0	2	0	0	112
		MG	1	0	3	0	0	12
		NG	0	0	0	0	0	0
		TOTAL	15	0	5	0	0	124
	8-Firemen/Assistant Drivers (Diesel and Electric)	BG	12	0	1	0	0	63
		MG	0	0	4	0	0	9

		NG	0	0	0	0	0	0
		TOTAL	12	0	5	0	0	72
	9-Shunters	BG	0	0	1	0	0	4
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	0	0	1	0	0	5
	10-Permanent Way Inspectors	BG	2	0	0	0	0	7
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	0	0	0	0	7
	11- Permanent Way Mistrys, Gangmates, Keymen &Gangmen	BG	0	0	0	0	0	6
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	6
	12-Loco Maintenance staff	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	13-Train examining staff and Carriage & Wagon maintenance staff	BG	2	0	0	0	0	7
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	0	0	0	0	7

	14-Signal Inspectors	BG	0	0	0	0	0	7
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	7
	15-Signal maintainers and other signalling staff	BG	0	0	1	0	0	5
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	1	0	0	5
	16-Other staff like the Commercial Staff and electrical staff	BG	0	0	0	0	0	15
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	15
	17-TOTAL	BG	35	60	9	0	0	396
		MG	7	0	8	0	0	38
		NG	0	0	0	0	0	0
		TOTAL	42	60	17	0	0	434

'Note: Break-up of Staff held responsible not furnished by S.E. Railway

Contd.-----/-

Annexure- 9(Contd…)

Categories of staff held responsible for Collisions - Gauge-wise, Railway wise in five-year blocks

PERIOD	Categories of staff held responsible	Gauge	Number of Staff held responsible for collisions					
			CR	ER	NR	NE	NF	SR
1988-89 to 1992-93	1- Station Masters, Asst. Station Masters, and Cabin Assistant Station Master	BG	7	12	8	5	2	4
		MG	0	0	1	5	3	1
		NG	0	0	0	0	0	0
		TOTAL	7	12	9	10	5	5
	2- Switchmen	BG	0	11	1	0	0	1
		MG	0	0	1	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	11	2	0	0	1
	3- Pointsmen	BG	2	0	0	3	0	1
		MG	0	0	2	2	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	0	2	5	0	1
	4-Levermen and Cabinmen	BG	4	2	5	0	0	0
		MG	0	0	0	0	0	0

		NG	0	0	0	0	0	0
		TOTAL	4	2	5	0	0	0
	5-Shunting Staff and other yard staff	BG	1	0	1	0	0	0
		MG	0	0	3	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	0	4	0	0	0
	6-Guards	BG	5	15	2	4	0	3
		MG	0	0	0	2	0	0
		NG	0	0	0	0	0	0
		TOTAL	5	15	2	6	0	3
	7-Drivers	BG	35	23	17	6	1	5
		MG	0	0	0	2	0	2
		NG	0	0	0	0	0	0
		TOTAL	35	23	17	8	1	7
	8-Firemen/Assistant Drivers (Diesel and Electric)	BG	8	9	14	5	1	3
		MG	0	0	0	2	0	1
		NG	0	0	0	0	0	0
		TOTAL	8	9	14	7	1	4
	9-Shunters	BG	1	0	1	1	0	0
		MG	0	0	1	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	0	2	1	0	0

	10-Permanent Way Inspectors	BG	2	0	3	0	0	1
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	0	3	0	0	1
	11- Permanent Way Mistrys, Gangmates, Keymen &Gangmen	BG	3	0	7	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	3	0	7	0	0	0
	12-Loco Maintenance staff	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	13-Train examining staff and Carriage & Wagon maintenance staff	BG	1	5	4	2	0	0
		MG	0	0	0	1	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	5	4	3	0	0
	14-Signal Inspectors	BG	0	3	0	1	0	1
		MG	0	0	0	1	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	3	0	2	0	1
	15-Signal maintainers and other signalling staff	BG	0	1	0	0	0	0
		MG	0	0	0	1	0	0

		NG	0	0	0	0	0	0
		TOTAL	0	1	0	1	0	0
	16-Other staff like the Commercial Staff and electrical staff	BG	2	0	2	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	0	2	0	0	0
	17-TOTAL	BG	71	81	65	27	4	19
		MG	0	0	8	16	3	4
		NG	0	0	0	0	0	0
		TOTAL	71	81	73	43	7	23

PERIOD	**Categories of staff held responsible**	**Gauge**	**Number of Staff held responsible for collisions**					
			SC	**SE***	**WR****	**METRO**	**KRC**	**TOTAL**
1988-89 to 1992-93	1- Station Masters, Asst. Station Masters, and Cabin Assistant Station Master	BG	4	0	11	0	0	53
		MG	0	0	0	0	0	10
		NG	0	0	0	0	0	0
		TOTAL	4	0	11	0	0	63
	2- Switchmen	BG	0	0	1	0	0	14
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	0	0	1	0	0	15

	3- Pointsmen	BG	3	0	5	0	0	14
		MG	0	0	0	0	0	4
		NG	0	0	0	0	0	0
		TOTAL	3	0	5	0	0	18
	4-Levermen and Cabinmen	BG	1	0	0	0	0	12
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	0	0	0	0	12
	5-Shunting Staff and other yard staff	BG	0	0	0	0	0	2
		MG	0	0	0	0	0	3
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	5
	6-Guards	BG	1	0	5	0	0	35
		MG	0	0	0	0	0	2
		NG	0	0	0	0	0	0
		TOTAL	1	0	5	0	0	37
	7-Drivers	BG	8	0	18	0	0	113
		MG	0	0	4	0	0	8
		NG	0	0	0	0	0	0
		TOTAL	8	0	22	0	0	121
	8-Firemen/Assistant Drivers (Diesel and Electric)	BG	5	0	6	0	0	51
		MG	0	0	2	0	0	5

		NG	0	0	0	0	0	0
		TOTAL	5	0	8	0	0	56
	9-Shunters	BG	0	0	0	0	0	3
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	4
	10-Permanent Way Inspectors	BG	0	0	1	0	0	7
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	1	0	0	7
	11- Permanent Way Mistrys, Gangmates, Keymen &Gangmen	BG	3	0	0	0	0	13
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	3	0	0	0	0	13
	12-Loco Maintenance staff	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	13-Train examining staff and Carriage & Wagon maintenance staff	BG	1	0	4	0	0	17
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	1	0	4	0	0	18

	14-Signal Inspectors	BG	0	0	0	0	0	5
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	6
	15-Signal maintainers and other signalling staff	BG	0	0	0	0	0	1
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	2
	16-Other staff like the Commercial Staff and electrical staff	BG	0	0	6	0	0	10
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	6	0	0	10
	17-TOTAL	BG	26	63	65	0	0	421
		MG	0	0	6	0	0	37
		NG	0	0	0	0	0	0
		TOTAL	26	63	71	0	0	458

****Note: For the year 96-97. One case is still under process details of which are not available. For 97-98.**

Out of 22 cases, details of only 15 cases have been furnished and the rest are still under process.

***Note: Break-up of staff held responsible not furnished by S.E. Railway.**

Annexure – 10

Number of Collisions classified according to the nature of failure of station staff – Gauge wise & Railway wise in 5 – year blocks

Period	Nature of failure of station staff	Number of Collisions							
		CR				ER			
	1) Reception of a train on a blocked line due to:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1988-89 to 1992-93	a) line being occupied	2	0	0	2	7	0	0	7
	b) incorrect setting of points	1	0	0	1	3	0	0	3
	c) signals taken off for a train not put back to 'on'	0	0	0	0	0	0	0	0
	d) fouling mark not clear	0	0	0	0	3	0	0	3
	e) obstruction of line during shunting	0	0	0	0	3	0	0	3
	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	3	0	0	3	16	0	0	16

Period	Nature of failure of station staff	Number of Collisions							
		NR				NE			
		BG	MG	NG	Total	BG	MG	NG	Total
1988-89 to 1992-93	a) line being occupied	2	0	0	2	0	0	0	0
	b) incorrect setting of points	0	0	0	0	0	0	0	0
	c) signals taken off for a train not put back to 'on'	0	0	0	0	0	0	0	0
	d) fouling mark not clear	0	0	0	0	0	0	0	0
	e) obstruction of line during shunting	0	0	0	0	0	0	0	0
	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	2	0	0	2	0	0	0	0

Period	Nature of failure of station staff	Number of Collisions							
		NF				SR			
		BG	MG	NG	Total	BG	MG	NG	Total
1988-89 to 1992-93	a) line being occupied	1	0	0	1	0	0	0	0
	b) incorrect setting of points	0	0	0	0	1	0	0	1
	c) signals taken off for a train not put back to 'on'	0	0	0	0	0	0	0	0
	d) fouling mark not clear	0	0	0	0	2	0	0	2
	e) obstruction of line during	0	0	0	0	0	0	0	0

	shunting								
	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	1	0	0	1	3	0	0	3

Period	**Nature of failure of station staff**	**Number of Collisions**							
		NF				**SR**			
	2)When despatching a train:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1988-89 to 1992-93	a) by sending it into a blocked section	0	0	0	0	2	0	0	2
	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	1	0	0	1	2	0	0	2
	d) incorrect setting of 0points	1	0	0	1	1	0	0	1
	TOTAL	2	0	0	2	5	0	0	5

Period	**Nature of failure of station staff**	**Number of Collisions**							
		NR				**NE**			
	2)When despatching a train:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1988-89 to	a) by sending it into a blocked	1	0	0	1	0	0	0	0

1992-93	section								
	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	0	0	0	0	0	0	0	0
	d) incorrect setting of 0points	0	0	0	0	0	0	0	0
	TOTAL	1	0	0	1	0	0	0	0

Period	Nature of failure of station staff	Number of Collisions							
		NF				SR			
	2)When despatching a train:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1988-89 to 1992-93	a) by sending it into a blocked section	0	0	0	0	0	0	0	0
	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	0	0	0	0	0	0	0	0
	d) incorrect setting of 0points	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0

Period	**Nature of failure of station staff**	**Number of Collisions**							
		NF				**SR**			
1988-89 to 1992-93	3)Collision in block section or at stations due to vehicles escaping	0	0	0	0	0	0	0	0
	Grand Total	5	0	0	5	21	0	0	21

Period	Nature of failure of station staff	Number of Collisions							
		NR				NE			
1988-89 to 1992-93	3)Collision in block section or at stations due to vehicles escaping	0	0	0	0	0	0	0	0
	Grand Total	3	0	0	3	0	0	0	0

Period	Nature of failure of station staff	Number of Collisions							
		NF				SR			
1988-89 to 1992-93	3)Collision in block section or at stations due to vehicles escaping	0	0	0	0	0	0	0	0
	Grand Total	1	0	0	1	3	0	0	3

Period	Nature of failure of station staff	Number of Collisions							
		SC				SE			
	1) Reception of a train on a blocked line due to:								
		BG	MG	NG	Total	BG	MG	NG	Total
1988-89 to 1992-93	a) line being occupied	0	1	0	1	2	0	0	2
	b) incorrect setting of points	0	1	0	1	2	0	0	2
	c) signals taken off for a train not put back to 'on'	0	0	0	0	0	0	0	0
	d) fouling mark not clear	0	0	0	0	2	0	0	2
	e) obstruction of line during shunting	1	0	0	1	0	0	0	0

	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	1	2	0	3	6	0	0	6

Period	**Nature of failure of station staff**	**Number of Collisions**							
		WR				**METRO**			
	1) Reception of a train on a blocked line due to:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1988-89 to 1992-93	a) line being occupied	1	0	0	1	0	0	0	0
	b) incorrect setting of points	1	2	0	3	0	0	0	0
	c) signals taken off for a train not put back to 'on'	0	0	0	0	0	0	0	0
	d) fouling mark not clear	0	0	0	0	0	0	0	0
	e) obstruction of line during shunting	0	0	0	0	0	0	0	0
	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	2	2	0	4	0	0	0	0

Period	**Nature of failure of station staff**	**Number of Collisions**							
		KRC				**TOTAL**			
	1) Reception of a train on a blocked line due to:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1988-89 to	a) line being occupied	0	0	0	0	15	1	0	16

1992-93	b) incorrect setting of points	0	0	0	0	8	3	0	11
	c) signals taken off for a train not put back to 'on'	0	0	0	0	0	0	0	0
	d) fouling mark not clear	0	0	0	0	7	0	0	7
	e) obstruction of line during shunting	0	0	0	0	4	0	0	4
	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	34	4	0	38

Period	**Nature of failure of station staff**	**Number of Collisions**							
		SC				**SE**			
	2)When despatching a train:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1988-89 to 1992-93	a) by sending it into a blocked section	0	0	0	0	2	0	0	2
	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	0	0	0	0	1	0	0	1
	d) incorrect setting of 0points	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	3	0	0	3

Period	Nature of failure of station staff	Number of Collisions							
		WR				METRO			
	2)When despatching a train:								
		BG	MG	NG	Total	BG	MG	NG	Total
1988-89 to 1992-93	a) by sending it into a blocked section	0	0	0	0	0	0	0	0
	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	0	0	0	0	0	0	0	0
	d) incorrect setting of 0points	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0

Period	Nature of failure of station staff	Number of Collisions							
		KRC				TOTAL			
	2)When despatching a train:								
		BG	MG	NG	Total	BG	MG	NG	Total
1988-89 to 1992-93	a) by sending it into a blocked section	0	0	0	0	5	0	0	5
	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	0	0	0	0	4	0	0	4
	d) incorrect setting of 0points	0	0	0	0	2	0	0	2
	TOTAL	0	0	0	0	11	0	0	11

Period	Nature of failure of station staff	Number of Collisions							
		SC				SE			
1988-89 to 1992-93	3)Collision in block section or at stations due to vehicles escaping	1	0	0	1	0	0	0	0
	Grand Total	2	2	0	4	9	0	0	9

Period	Nature of failure of station staff	Number of Collisions							
		WR				METRO			
1988-89 to 1992-93	3)Collision in block section or at stations due to vehicles escaping	0	0	0	0	0	0	0	0
	Grand Total	2	2	0	4	0	0	0	0

Period	Nature of failure of station staff	Number of Collisions							
		KRC				TOTAL			
1988-89 to 1992-93	3)Collision in block section or at stations due to vehicles escaping	0	0	0	0	1	0	0	1
	Grand Total	0	0	0	0	46	4	0	50

Annexure – 10(Contd…)

Number of Collisions classified according to the nature of failure of station staff – Gauge wise & Railway wise in 5 – year blocks

Period	Nature of failure of station staff	Number of Collisions							
		CR				ER			
	1) Reception of a train on a blocked line due to:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1993-94 to 1997-98	a) line being occupied	0	0	0	0	7	0	0	7
	b) incorrect setting of points	2	0	0	2	1	0	0	1
	c) signals taken off for a train not put back to 'on'	0	0	0	0	0	0	0	0
	d) fouling mark not clear	0	0	0	0	1	0	0	1
	e) obstruction of line during shunting	0	0	0	0	0	0	0	0
	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	2	0	0	2	9	0	0	9

Period	Nature of failure of station staff	Number of Collisions							
		NR				NE			
	1) Reception of a train on a blocked line due to:								
		BG	MG	NG	Total	BG	MG	NG	Total
1993-94 to 1997-98	a) line being occupied	3	1	0	4	0	0	0	0
	b) incorrect setting of points	0	0	0	0	0	0	0	0
	c) signals taken off for a train not put back to 'on'	1	0	0	1	0	0	0	0
	d) fouling mark not clear	1	0	0	1	0	0	0	0
	e) obstruction of line during shunting	1	0	0	1	1	0	0	1
	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	6	1	0	7	1	0	0	1

Period	Nature of failure of station staff	Number of Collisions							
		NF				SR			
	1) Reception of a train on a blocked line due to:								
		BG	MG	NG	Total	BG	MG	NG	Total
1993-94 to 1997-98	a) line being occupied	0	0	0	0	1	0	0	1
	b) incorrect setting of points	0	0	0	0	0	0	0	0
	c) signals taken off for a train	0	0	0	0	0	0	0	0

	not put back to 'on'								
	d) fouling mark not clear	0	0	0	0	0	0	0	0
	e) obstruction of line during shunting	0	0	0	0	0	0	0	0
	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	0	1	0	1	1	0	0	1

Period	**Nature of failure of station staff**	**Number of Collisions**							
		CR				**ER**			
	2)When despatching a train:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1993-94 to 1997-98	a) by sending it into a blocked section	0	0	0	0	1	0	0	1
	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	0	0	0	0	1	0	0	1
	d) incorrect setting of 0points	1	0	0	1	0	0	0	0
	TOTAL	1	0	0	1	2	0	0	2

Period	**Nature of failure of station staff**	**Number of Collisions**							
		NR				**NE**			
	2)When despatching a train:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1993-94 to 1997-98	a) by sending it into a blocked section	1	0	0	1	1	2	0	3

	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	0	0	0	0	0	0	0	0
	d) incorrect setting of 0points	0	0	0	0	0	0	0	0
	TOTAL	1	0	0	1	1	2	0	3

Period	**Nature of failure of station staff**	**Number of Collisions**							
		NF				**SR**			
	2)When despatching a train:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1993-94 to 1997-98	a) by sending it into a blocked section	1	0	0	1	1	0	0	1
	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	0	0	0	0	0	0	0	0
	d) incorrect setting of 0points	0	0	0	0	0	0	0	0
	TOTAL	1	0	0	1	1	0	0	1

Period	**Nature of failure of station staff**	**Number of Collisions**							
		CR				**ER**			
1993-94 to 1997-98	3)Collision in block section or at stations due to vehicles escaping	0	0	0	0	1	0	0	1
	Grand Total	7	0	0	7	12	0	0	12

Period	Nature of failure of station staff	Number of Collisions							
		NR				NE			
1993-94 to 1997-98	3)Collision in block section or at stations due to vehicles escaping	0	0	0	0	0	0	0	0
	Grand Total	7	1	0	8	2	2	0	4

Period	Nature of failure of station staff	Number of Collisions							
		NF				SR			
1993-94 to 1997-98	3)Collision in block section or at stations due to vehicles escaping	0	0	0	0	0	0	0	0
	Grand Total	1	1	0	2	2	0	0	2

Period	Nature of failure of station staff	Number of Collisions							
		SC				SE			
	1) Reception of a train on a blocked line due to:								
		BG	MG	NG	Total	BG	MG	NG	Total
1993-94 to 1997-98	a) line being occupied	2	0	0	2	0	0	0	0
	b) incorrect setting of points	0	0	0	0	2	0	0	2
	c) signals taken off for a train not put back to 'on'	0	0	0	0	0	0	0	0
	d) fouling mark not clear	0	0	0	0	0	0	0	0
	e) obstruction of line during shunting	0	0	0	0	0	0	0	0

	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	2	0	0	2	2	0	0	2

Period	**Nature of failure of station staff**	**Number of Collisions**							
		WR				**METRO**			
	1) Reception of a train on a blocked line due to:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1993-94 to 1997-98	a) line being occupied	3	0	0	3	0	0	0	0
	b) incorrect setting of points	0	0	0	0	0	0	0	0
	c) signals taken off for a train not put back to 'on'	0	0	0	0	0	0	0	0
	d) fouling mark not clear	1	0	0	1	0	0	0	0
	e) obstruction of line during shunting	0	0	0	0	0	0	0	0
	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	4	0	0	4	0	0	0	0

Period	**Nature of failure of station staff**	**Number of Collisions**							
		KRC				**TOTAL**			
	1) Reception of a train on a blocked line due to:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1993-94 to	a) line being occupied	0	0	0	0	16	1	0	17

1997-98	b) incorrect setting of points	0	0	0	0	5	0	0	5
	c) signals taken off for a train not put back to 'on'	0	0	0	0	1	0	0	1
	d) fouling mark not clear	0	0	0	0	3	0	0	3
	e) obstruction of line during shunting	0	0	0	0	2	0	0	2
	f) at station in automatic territories	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	27	1	0	28

Period	**Nature of failure of station staff**	**Number of Collisions**							
		SC				**SE**			
	2)When despatching a train:								
		BG	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
1993-94 to 1997-98	a) by sending it into a blocked section	0	0	0	0	2	0	0	2
	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	0	0	0	0	1	0	0	1
	d) incorrect setting of 0points	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	3	0	0	3

Period	Nature of failure of station staff	Number of Collisions							
		WR				METRO			
	2)When despatching a train:								
		BG	MG	NG	Total	BG	MG	NG	Total
1993-94 to 1997-98	a) by sending it into a blocked section	0	0	0	0	0	0	0	0
	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	0	0	0	0	0	0	0	0
	d) incorrect setting of 0points	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0

Period	Nature of failure of station staff	Number of Collisions							
		KRC				TOTAL			
	2)When despatching a train:								
		BG	MG	NG	Total	BG	MG	NG	Total
1993-94 to 1997-98	a) by sending it into a blocked section	0	0	0	0	7	2	0	9
	b) fouling mark not clear	0	0	0	0	0	0	0	0
	c) obstruction during shunting or bumping against train going away	0	0	0	0	2	0	0	2
	d) incorrect setting of 0points	0	0	0	0	1	0	0	1
	TOTAL	0	0	0	0	10	2	0	12

Period	Nature of failure of station staff	Number of Collisions							
		SC				SE			
1993-94 to 1997-98	3)Collision in block section or at stations due to vehicles escaping	1	0	0	1	0	0	0	0
	Grand Total	3	0	0	3	5	0	0	5

Period	Nature of failure of station staff	Number of Collisions							
		WR				METRO			
1993-94 to 1997-98	3)Collision in block section or at stations due to vehicles escaping	1	0	0	1	0	0	0	0
	Grand Total	5	0	0	5	0	0	0	0

Period	Nature of failure of station staff	Number of Collisions							
		KRC				TOTAL			
1993-94 to 1997-98	3)Collision in block section or at stations due to vehicles escaping	0	0	0	0	3	0	0	3
	Grand Total	0	0	0	0	44	3	0	47

Annexure-11

Number of collisions according to the nature of failure of Drivers Railway-wise, Gauge-wise in 5-year blocks

PERIOD	Nature of failure of drivers	Gauge	Number of Staff held responsible for collisions					
			CR	ER	NR	NE	NF	SR
1988-89 to 1992-93	a) Disregarding signals or over-shooting	BG	14	10	15	7	2	0
		MG	0	0	1	2	3	0
		NG	0	0	0	0	0	0
		TOTAL	14	10	16	9	5	0
	b) Falling to control trains on account of defective brake power	BG	2	0	1	0	0	1
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	0	1	0	0	1
	c) Mismanagement of the engine crew or running at excessive speed	BG	2	6	1	0	0	1
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	6	1	0	0	1
	d) Not observing rules when passing automatic signal	BG	0	3	0	0	0	4
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0

		TOTAL	0	3	0	0	0	4
	e) Moving against signals during shunting	BG	1	0	0	0	0	0
		MG	0	0	1	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	0	1	0	0	0
	f) Total	BG	19	19	17	7	2	6
		MG	0	0	2	2	3	0
		NG	0	0	0	0	0	0
		TOTAL	19	19	19	9	5	6

PERIOD	**Nature of failure of drivers**	**Gauge**	**Number of Staff held responsible for collisions**					
			SC	**SE**	**WR**	**METRO**	**KRC**	**Total**
1988-89 to 1992-93	a) Disregarding signals or over-shooting	BG	8	5	8	0	0	69
		MG	1	0	4	0	0	11
		NG	0	0	0	0	0	0
		TOTAL	9	5	12	0	0	80
	b) Falling to control trains on account of defective brake power	BG	2	0	0	0	0	6
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	0	0	0	0	6

	c) Mismanagement of the engine crew or running at excessive speed	BG	1	0	1	0	0	12
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	0	1	0	0	12
	d) Not observing rules when passing automatic signal	BG	0	6	0	0	0	13
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	6	0	0	0	13
	e) Moving against signals during shunting	BG	0	0	0	0	0	1
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	2
	f) Total	BG	11	11	9	0	0	101
		MG	1	0	4	0	0	12
		NG	0	0	0	0	0	0
		TOTAL	12	11	13	0	0	113

PERIOD	Nature of failure of drivers	Gauge	Number of Staff held responsible for collisions					
			CR	ER	NR	NE	NF	SR
93-94 to 97-98	a) Disregarding signals or over-shooting	BG	19	7	11	4	0	0
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	19	7	11	4	0	1
	b) Falling to control trains on account of defective brake power	BG	2	3	1	1	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	3	1	1	0	0
	c) Mismanagement of the engine crew or running at excessive speed	BG	0	3	0	0	0	1
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	3	0	0	0	1
	d) Not observing rules when passing automatic signal	BG	2	4	0	2	0	3
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	2	4	0	2	0	4
	e) Moving against signals during shunting	BG	0	2	0	0	1	0
		MG	0	0	0	0	0	0

		NG	0	0	0	0	0	0
		TOTAL	0	2	0	0	1	0
	f) Total	BG	23	19	12	7	1	4
		MG	0	0	0	0	0	2
		NG	0	0	0	0	0	0
		TOTAL	23	19	12	7	1	6

PERIOD	**Nature of failure of drivers**	**Gauge**	**Number of Staff held responsible for collisions**					
			SC	**SE**	**WR**	**METRO**	**KRC**	**Total**
1988-89 to 1992-93	a) Disregarding signals or over-shooting	BG	5	9	14	0	0	69
		MG	0	0	4	0	0	5
		NG	0	0	0	0	0	0
		TOTAL	5	9	18	0	0	74
	b) Falling to control trains on account of defective brake power	BG	0	0	0	0	0	7
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	7
	c) Mismanagement of the engine crew or running at excessive speed	BG	0	2	3	0	0	9
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	2	3	0	0	9

	d) Not observing rules when passing automatic signal	BG	1	0	1	0	0	13
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	1	0	1	0	0	14
	e) Moving against signals during shunting	BG	0	0	0	0	0	3
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	3
	f) Total	BG	6	11	18	0	0	101
		MG	0	0	4	0	0	6
		NG	0	0	0	0	0	0
		TOTAL	6	11	22	0	0	107

Annexure – 12

CASUALTIES AND LOSS OUE TO OAMAGE TO RAILWAY PROPERTIES IN COLLISIONS (ALL GAUGES COMBINED). RAILWAY.WISE & YEAR-WISE

YEAR	CR					ER				
	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)
		Killed	Injured	Total			Killed	njured	Total	
88-89	4	3	15	58	61.72	8	5	12	17	155.08
89-90	7	0	13	13	20.87	9	9	44	53	140.48
90-91	9	9	58	65	631.43	10	32	79	111	301.58
91-92	3	4	22	26	202.31	6	8	21	29	219.80
92-93	9	6	65	71	776.31	7	4	41	45	305.88
5-yr. Total	32	22	211	233	1693.14	40	58	197	255	1122.78
93-94	6	15	81	96	534.33	10	6	22	28	218.20
94-95	8	8	59	67	400.65	5	1	22	23	66.27
95-96	4	1	14	15	156.41	6	45	183	228	285.90
96-97	7	5	4	9	100.20	6	4	9	13	412.96
97-98	12	14	120	134	259.32	4	2	2	4	311.88
5-yr. Total	37	43	278	321	1450.91	31	58	238	296	1295.21

YEAR	NR					NE				
	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)
		Killed	Injured	Total			Killed	Injured	Total	
88-89	6	0	10	10	5.90	1	2	15	17	1.70
89-90	2	0	2	2	0.05	3	1	18	19	80.10
90-91	5	0	4	4	153.00	3	3	68	71	33.60
91-92	5	14	55	69	113.50	1	0	22	22	1.63
92-93	8	19	66	85	109.30	1	0	23	23	8.91
5-yr. Total	26	33	137	170	381.75	9	6	146	152	125.94
93-94	12	0	20	20	212.80	3	23	81	104	58.48
94-95	7	6	0	6	96.00	3	0	12	12	1.10
95-96	3	313	277	590	484.40	2	3	4	7	5.40
96-97	2	0	0	0	0.07	2	54	85	139	6.28
97-98	4	52	74	126	114.30	1	1	1	2	6.60
5-yr. Total	28	371	371	742	887.571	11	81	183	264	77.86

YEAR	NF					SR				
	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)
		Killed	Injured	Total			Killed	Injured	Total	
88-89	1	0	2	2	0.25	1	0	0	0	0
89-90	3	2	31	33	0.81	0	0	0	0	0
90-91	1	1	1	2	214.17	4	0	29	29	83
91-92	2	0	2	2	1.41	0	0	0	0	0.00
92-93	0	0	0	0	0.00	6	1	32	33	14.00
5-yr. Total	7	3	36	39	216.64	11	1	61	62	97.00
93-94	1	0	1	1	1.07	3	21	31	52	133.00
94-95	0	0	0	0	0.00	3	1	4	5	33.00
95-96	0	0	0	0	0	3	54	50	104	396.00
96-97	0	0	0	0	0.00	0	0	0	0	0.00
97-98	2	1	12	13	1.19	2	0	0	0	0.00
5-yr. Total	3	1	13	14	2.26	11	76	85	161	562.00

YEAR	SC					SE				
	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)
		Killed	Injured	Total			Killed	Injured	Total	
88-89	4	0	22	22	2.00	2	0	0	0	54.50
89-90	2	3	1	4	97.37	7	3	26	29	46.30
90-91	3	39	112	151	354.65	4	2	4	6	0.00
91-92	5	17	175	192	148.41	6	0	2	2	48.40
92-93	5	26	29	55	166.41	10	42	53	95	228.20
5-yr. Total	19	85	339	424	768.84	29	47	85	132	377.40
93-94	5	0	7	7	72.09	8	1	3	4	18.50
94-95	1	1	0	1	67.76	5	1	2	3	27.50
95-96	3	0	5	5	145.78	4	8	7	15	373.6
96-97	1	0	1	1	30.90	3	5	3	8	437.70
97-98	1	0	1	1	0.25	4	0	7	7	225.70
5-yr. Total	11	1	14	15	316.78	24	15	22	37	1083.00

YEAR	WR					METRO				
	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)
		Killed	Injured	Total			Killed	Injured	Total	
88-89	3	0	0	0	2.48	0	0	0	0	0.00
89-90	1	0	0	0	0.02	0	0	0	0	0.00
90-91	2	0	32	32	5.71	0	0	0	0	0.00
91-92	2	3	44	47	5.11	0	0	0	0	0.00
92-93	7	10	62	72	314.45	0	0	0	0	0.00
5-yr. Total	15	13	138	151	327.77	0	0	0	0	0.00
93-94	6	82	171	253	247.16	0	0	0	0	0.00
94-95	4	4	21	25	98.59	0	0	0	0	0.00
95-96	4	0	7	7	12.31	0	0	0	0	0.00
96-97	5	0	0	0	7.98	0	0	0	0	0.00
97-98	5	2	19	21	12.24	0	0	0	0	0.00
5-yr. Total	24	88	218	306	378.28	0	0	0	0	0.00

YEAR	KRC					Total Of all Indian Railway				
	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)	Total no. of Collisions	No. of Casualties			Cost of damages (Rs. In lakhs)
		Killed	Injured	Total			Killed	Injured	Total	
88-89	0	0	0	0	0	30	10	116	126	283.63
89-90	0	0	0	0	0	34	18	135	153	385.98
90-91	0	0	0	0	0	41	86	385	471	1777.12
91-92	0	0	0	0	0.00	30	46	343	389	740.57
92-93	0	0	0	0	0.00	53	108	371	479	1923.96
5-yr. Total	0	0	0	0	0.00	188	268	1350	1618	5111.26
93-94	0	0	0	0	0.00	54	148	417	585	1495.63
94-95	0	0	0	0	0.00	36	00	120	142	790.87
95-96	0	0	0	0	0	29	424	547	971	1839.8
96-97	0	0	0	0	0.00	26	68	102	170	996.09
97-98	0	0	0	0	0.00	35	72	236	308	931.48
5-yr. Total	0	0	0	0	0.00	180	734	1422	2156	6053.87

Annexure-13

Collision Involving diesel locomotives on the Broad, Metre & Narrow Gauges according to the mode of working- railway-wise-in 5-year blocks.

LH-Long-hood leading.

1988-89 to 1992-93												
	Gauge	**Head on collision**			**Rear-end collisions**			**Side-collisions**			**All Collisions**	
		LH	**SH**	**TOTAL**	**LH**	**SH**	**TOTAL**	**LH**	**SH**	**TOTAL**	**LH**	**SH**	**TOTAL**
CR	BG	3	3	6	6	7	13	2	2	4	11	12	23
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	3	3	6	6	7	13	2	2	4	11	12	23
ER	BG	3	2	5	10	4	14	8	4	12	21	10	31
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	3	2	5	10	4	14	8	4	12	21	10	31
NR	BG	2	1	3	7	1	8	0	2	2	9	4	13
	MG	0	2	2	0	0	0	0	0	0	0	2	2
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	2	3	5	7	1	8	0	2	2	9	6	15

NE	NE	0	2	2	0	5	5	0	0	0	0	7	7
	MG	0	1	1	1	0	1	0	0	0	1	1	2
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	3	3	1	5	6	0	0	0	1	8	9
NF	BG	0	0	0	0	0	0	0	0	0	0	0	0
	MG	0	0	0	0	0	3	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0
SR	BG	0	0	0	0	0	0	0	0	0	0	0	0
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0
SC	BG	7	0	7	7	1	8	1	0	1	15	1	16
	MG	1	1	2	0	0	0	1	0	1	2	1	3
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	8	1	9	7	1	8	2	0	2	17	2	19
SE	BG	0	0	0	0	0	0	0	0	0	0	0	0
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0
WR	BG	0	0	0	0	0	0	0	0	0	0	0	0
	MG	0	0	0	0	0	0	0	0	0	0	0	0

	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0
Metro	BG	0	0	0	0	0	0	0	0	0	0	0	0
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0
KRC	BG	0	0	0	0	0	0	0	0	0	0	0	0
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	
TOTAL	BG	15	8	23	30	18	48	11	8	19	56	34	90
	MG	1	4	5	1	0	1	1	0	1	3	4	7
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	16	12	28	31	18	49	12	8	20	59	38	97

SH-Short -hood leading

1993-94 to 1997-98													
	Gauge	**Head on collision**			**Rear-end collisions**			**Side-collisions**			**All Collisions**		
		LH	**SH**	**TOTAL**	**LH**	**SH**	**TOTAL**	**LH**	**SH**	**TOTAL**	**LH**	**SH**	**TOTAL**
CR	BG	1	0	1	6	3	9	2	4	6	9	7	16
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	1	0	1	6	3	9	2	4	6	9	7	16
ER	BG	3	1	4	5	2	7	1	4	5	9	7	16
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	3	1	4	5	2	7	1	4	5	9	7	16
NR	BG	6	2	8	4	0	4	2	2	4	12	4	16
	MG	0	0	0	0	1	1	0	1	1	0	2	2
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	6	2	8	4	1	5	2	3	5	12	6	18
NE	NE	0	3	3	0	6	6	0	0	0	0	9	9
	MG	0	1	1	0	1	1	0	0	0	0	2	2
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	4	4	0	7	7	0	0	0	0	11	11
NF	BG	0	0	0	0	0	0	0	0	0	0	0	0

	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0
SR	BG	1	1	2	0	0	0	1	2	3	2	3	5
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	1	1	2	0	0	0	1	2	3	2	3	5
SC	BG	1	0	1	7	0	7	1	2	3	9	2	11
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	1	0	1	7	0	7	1	2	3	9	2	11
SE	BG	0	0	0	0	0	0	0	0	0	0	0	0
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0
WR	BG	0	0	0	0	0	0	0	0	0	0	0	0
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0
Metro	BG	0	0	0	0	0	0	0	0	0	0	0	0
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0

	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0
KRC	BG	0	0	0	0	0	0	0	0	0	0	0	0
	MG	0	0	0	0	0	0	0	0	0	0	0	0
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	BG	12	7	19	22	11	33	7	14	21	41	32	73
	MG	0	1	1	0	2	2	0	1	1	0	4	4
	NG	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	12	8	20	22	13	35	7	15	22	41	36	77

Note: NF ,SE,& Western Railways have not furnished figures on LH & SH position for the entire 10 year block and SR has also not furnished figures for the first five year block 88-89

Annexure – 14

Cause-wise analysis of collisions-Railway-wise; for the period 1993-94 to 1997-98 year wise.

Year	Cause	CR	ER	NR	NE	NF	SR	SC	SE	WR	Metro	KRC	Total
1993-94	1-Reception of train on occupied line in station/section	0	3	1	0	0	0	1	0	0	0	0	6
	2-Fouling of line by adjacent line train	1	0	0	0	0	0	2	0	0	0	0	3
	3-Reception of train on line fouled by	0	0	0	0	1	1	0	0	0	0	0	1
	derailed vehicles from adjacent line												
	4-Allowing train into occupied block section	0	0	0	0	0	0	0	0	0	0	0	2
	5-Drivers disregarding	5	7	6	0	0	1	1	4	6	0	0	31

	signals, excess speed, etc.												
	6-Unauthorised tampering of signal gear resulting in admitting train into occupied line or occupied block section	0	0	0	0	0	1	0	0	0	0	0	1
	7-Trollies not being protected			3					1				4
	8-Other causes & Combination of staff			2				1	3				6
	9-Total	6	10	12	3	1	3	5	8	6	0	0	54

Year	Cause	CR	ER	NR	NE	NF	SR	SC	SE	WR	Metro	KRC	Total
1994-95	1-Reception of train on occupied line in station/section	0	1	1	2	0	1	0	1	0	0	0	6
	2-Fouling of line by adjacent line train	1	0	0	0	0	0	0	0	0	0	0	1
	3-Reception of train on line fouled by	0	0	0	0	0	0	0	0	0	0	0	0
	derailed vehicles from adjacent line												
	4-Allowing train into occupied block section	0	1	0	0	0	0	0	0	0	0	0	1
	5-Drivers disregarding signals, excess speed, etc.	5	3	3	1	0	1	1	2	4	0	0	2
	6-Unauthorised tampering of	0	0	0	0	0	0	0	0	0	0	0	0

	signal gear resulting in admitting train into occupied line or occupied block section												
	7-Trollies not being protected			1									
	8-Other causes & Combination of staff	2		2			1	0	2				7
	9-Total	8	5	7	3	0	3	1	5	4	0	0	36

1995-96	1-Reception of train on occupied line in station/section	1	3	3	0	0	0	0	0	0	0	0	7
	2-Fouling of line by adjacent line train	1	0	0	0	0	0	0	0	0	0	0	1
	3-Reception of train on line fouled by	0	0	0	0	0	0	0	0	0	0	0	0
	derailed vehicles from adjacent line												

	4-Allowing train into occupied block section	0	0	0	0	0	1	0	1	0	0	0	2
	5-Drivers disregarding signals, excess speed, etc.	2	3	0	2	0	2	3	1	4	0	0	17
	6-Unauthorised tampering of signal gear resulting in admitting train into occupied line or occupied block section	0	0		0	0	0	0	0	0	0	0	0
	7-Trollies not being protected												0
	8-Other causes & Combination of staff								2				2
	9-Total	4	6	3	2	0	3	3	4	4	0	0	29

1996-97	1-Reception of train on occupied line in station/section	1	1	0									2
	2-Fouling of line by adjacent line train	1	0	0	0	0	0	0	0	0	0	0	1
	3-Reception of train on line fouled by	1	0	0	0	0	0	0	0	1	0	0	2
	derailed vehicles from adjacent line												
	4-Allowing train into occupied block section	0	0	0	0	0	0	0	1	0	0	0	1
	5-Drivers disregarding signals, excess speed, etc.	3	4	1	2	0	0	1	2	4	0	0	17
	6-Unauthorised tampering of signal gear resulting in admitting train into occupied line or occupied block section	0	0	0	0	0	0	0	0	0	0	0	0
	7-Trollies not being												

	protected												
	8-Other causes & Combination of staff	1	1	1									3
	9-Total	7	6	2	2	0	0	1	3	5	0	0	26

1997-98	1-Reception of train on occupied line in station/section	1	2	1	0	0	0	0	1	0	0	0	5
	2-Fouling of line by adjacent line train	1		0	0	0	0	0	0	0	0	0	1
	3-Reception of train on line fouled by derailed vehicles from adjacent line	0		0	0	1	0	0	0	0	0	0	1
	4-Allowing train into occupied block section	0	0	1	0	0	0	0	0	0	0	0	1
	5-Drivers disregarding signals, excess speed, etc.	8	2	2	1	1	2	0	2	4	0	0	22

	6-Unauthorised tampering of signal gear resulting in admitting train into occupied line or occupied block section	0	0	0	0	0	0	0	0	0	0	0	0
	7-Trollies not being protected												0
	8-Other causes & Combination of staff	2						1	1	1			5
	9-Total	12	4	4	1	2	2	1	4	5	0	0	35

Annexure-15

Number of collisions on Indian Railways as per time of occurrence during 1993-94 to 1997-9

year	Rly.	Number of collisions	00-02 hrs	02-04 hrs	04-06 hrs	06-08 hrs	08-10 hrs	10-12 hrs	12-14 hrs	14-16 hrs	16-18 hrs	18-20 hrs	20-22 hrs	22-24 hrs	Total
1993-94	CR	6	1	1	1	0	0	0	0	2	0	0	1	0	6
	ER	10	3	0	1	0	0	0	2	0	1	1	2	0	10
	NR	12	1	1	1	1	1	0	0	1	2	1	1	2	12
	NE	3	1	1	0	0	1	0	0	0	0	0	0	0	3
	NF	1	0	1	0	0	0	0	0	0	0	0	0	0	1
	SR	3	0	1	0	0	0	0	0	1	0	0	0	1	3
	SC	5	0	1	0	0	0	0	0	0	0	0	3	1	5
	SE	8	2	2	1	0	0	1	0	0	0	0	1	1	8
	WR	6	1	1	0	0	0	0	0	0	3	0	1	0	6
	Metro	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	54	9	9	4	1	2	1	2	4	6	2	9	5	54

year	Rly.	Number of collisions	00-02 hrs	02-04 hrs	04-06 hrs	06-08 hrs	08-10 hrs	10-12 hrs	12-14 hrs	14-16 hrs	16-18 hrs	18-20 hrs	20-22 hrs	22-24 hrs	Total
1994-95	CR	8	1	1	1	0	0	0	2	1	0	0	1	1	8
	ER	5	0	2	0	0	0	0	0	0	0	1	1	1	5
	NR	7	1	0	1	0	0	1	0	0	1	0	1	2	7
	NE	3	0	0	1	0	0	0	0	0	1	0	1	0	3
	NF	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SR	3	1	0	2	0	0	0	0	0	0	0	0	0	3
	SC	1	0	0	0	0	0	0	0	0	0	0	1	0	1
	SE	5	1	1	2	0	0	0	0	0	0	0	1	0	5
	WR	4	0	1	1	1	0	0	0	0	0	0	1	0	4
	Metro	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	36	4	5	8	1	0	1	2	1	2	1	7	4	36

year	Rly.	Number of collisions	00-02 hrs	02-04 hrs	04-06 hrs	06-08 hrs	08-10 hrs	10-12 hrs	12-14 hrs	14-16 hrs	16-18 hrs	18-20 hrs	20-22 hrs	22-24 hrs	Total
1995-96	CR	4	0	0	0	0	1	0	1	1	0	0	1	0	4
	ER	6	0	2	1	0	1	0	1	0	1	0	0	0	6
	NR	3	0	1	0	0	0	0	0	0	0	0	2	0	3
	NE	2	0	0	1	1	0	0	0	0	0	0	0	0	2
	NF	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SR	3	0	0	1	0	0	1	0	0	0	0	0	1	3
	SC	3	2	0	0	0	0	0	0	0	1	0	0	0	3
	SE	4	0	0	2	0	0	0	1	0	0	1	0	0	4
	WR	4	1	0	1	0	0	0	0	0	1	0	1	0	4
	Metro	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	29	3	3	6	1	2	1	3	1	3	1	4	1	29

year	Rly.	Number of collisions	00-02 hrs	02-04 hrs	04-06 hrs	06-08 hrs	08-10 hrs	10-12 hrs	12-14 hrs	14-16 hrs	16-18 hrs	18-20 hrs	20-22 hrs	22-24 hrs	Total
1996-97	CR	7	0	1	0	1	1	2	0	0	1	0	0	1	7
	ER	6	1	1	1	0	0	0	0	1	1	1	0	0	6
	NR	2	0	1	0	0	1	0	0	0	0	0	0	0	2
	NE	2	0	1	0	0	0	0	0	0	1	0	0	0	2

	NF	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SR	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SC	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	SE	3	1	0	1	0	0	1	0	0	0	0	0	0	3
	WR	5	1	0	1	0	0	1	0	0	0	1	0	1	5
	Metro	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	26	3	4	3	1	2	4	0	1	3	3	0	2	26

year	**Rly.**	**Number of collisions**	**00-02 hrs**	**02-04 hrs**	**04-06 hrs**	**06-08 hrs**	**08-10 hrs**	**10-12 hrs**	**12-14 hrs**	**14-16 hrs**	**16-18 hrs**	**18-20 hrs**	**20-22 hrs**	**22-24 hrs**	**Total**
1996-97	CR	12	1	2	1	1	2	1	0	2	0	0	1	2	12
	ER	4	0	2	1	0	0	0	0	0	0	0	0	0	4
	NR	4	0	1	1	0	1	0	0	0	0	0	1	1	4
	NE	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	NF	2	0	0	0	0	0	0	2	0	0	0	0	0	2
	SR	2	0	0	1	0	0	0	0	0	0	0	0	1	2
	SC	1	00	1	0	0	0	0	0	0	0	0	0	0	1
	SE	4	0	1	1	0	0	0	0	1	0	1	0	0	4
	WR	5	0	0	1	1	0	0	0	0	1	2	0	0	5
	Metro	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	KRC	0	0	0	0	0		0	0	0	0	0	0	0	0
	TOTAL	35	1	7	6	2	3	1	2	3	1	3	2	4	35

year	Rly.	Number of collisions	00-02 hrs	02-04 hrs	04-06 hrs	06-08 hrs	08-10 hrs	10-12 hrs	12-14 hrs	14-16 hrs	16-18 hrs	18-20 hrs	20-22 hrs	22-24 hrs	Total
TOTAL	CR	37	3	5	3	2	4	3	3	6	1	0	3	4	37
	ER	31	4	7	4	0	1	0	3	1	3	3	4	1	31
	NR	28	2	4	3	1	3	1	0	1	3	1	4	5	28
	NE	11	1	2	2	1	1	0	0	0	2	0	2	0	11
	NF	3	0	1	0	0	0	0	2	0	0	0	0	0	3
	SR	11	1	1	4	0	0	1	0	1	0	0	0	3	11
	SC	11	2	2	0	0	0	0	0	0	1	1	4	1	11
	SE	24	4	4	7	0	0	2	1	1	0	2	2	1	24
	WR	24	3	2	4	2	0	1	0	0	5	3	3	1	24
	Metro	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	180	20	28	27	6	9	8	9	10	15	10	22	16	180

Annexure -16

NUMBER AND INCIDENCE OF DERAILMENTS CORRELATEO TO DENSTTY OF IRAFFIC. RAILWAY WISE, GAUGE WISE & YEAR WISE

A = Number of derailment B= Incidence of derailments per million train kilometres

YEAR	CENTRAL								EASTERN							
	BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
88-89	47	0.46			4	1.85	51	0.49	69	0.94					69	0.94
89-90	41	0.39			4	1.78	45	0.42	55	0.72					55	0.74
90-91	37	0.36					37	0.36	48	0.64					48	0.64
91-92	43	0.42					43	0.41	47	0.62					47	0.62
92-93	36	0.35					36	0.34	35	0.45					35	0.45
5-yr. Total	204	0.40	0		8	0.73	212	0.40	254	0.67	0		0		254	0.68
93-94	41	0.38					41	0.37	37	0.48					37	0.48
94-95	46	0.44					46	0.43	28	0.35					28	0.35
95-96	43	0.40					43	0.40	24	0.30					24	0.30
96-97	41	0.38					41	0.37	20	0.25					20	0.25
97-98	49	0.45					49	0.44	21	0.26			1	1.2	22	0.27
5-yr. Total	220	0.41	0		0		220	0.40	130	0.33	0		1	0.24	131	0.33

YEAR	NORTHERN								NORTHEASTERN							
	BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
88-89	53	0.65	9	0.6	0	0	62	0.63	3	0.34	20	0.85			23	0.71
89-90	47	0.56	9	0.6	0	0	56	0.56	5	0.54	14	0.59			19	0.57
90-91	40	0.46	7	0.47	0	0	47	0.45	9	0.92	10	0.43			19	0.58
91-92	35	0.38	10	2.62	1	1	46	0.42	4	0.38	8	0.35			12	0.36
92-93	79	0.88	40	2.07	1	1	120		7	0.63	20	0.91			27	0.81
5-yr. Total	254	0.59	75	1.272	2	0.40	331	0.41	28	0.56	72	0.626	0	0.00	100	0.61
93-94	94	1.03	15	1.15	3	3	112	1.06	8	0.69	17	0.9			25	0.82
94-95	97	1.02	4	0.4	1	1	102	0.97	8	0.61	8	0.46			16	0.53
95-96	49	0.52	2	0.25	0	0	51	0.47	16		5				21	0.68
96-97	65	0.63	6	2	0	0	71	0.66	6	0.37	1	0.06			7	0.22
97-98	36	0.33	3	0.38	1	1	40	0.33	7	0.38	6	0.38			13	0.38
5-yr. Total	341	0.71	30	0.836	5	1	376	0.70	45	0.41	37	0.36	0		82	0.53

YEAR	NORTHEAST FRONTIER								SOUTHERN							
	BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
88-89	19	3.3	37	3.2			56	3.2	20	0.64	25	1.04			46	1.65
89-90	8	1.37	32	2.8			40	2.32	22	0.69	22	0.91			44	1.58
90-91	11	1.92	35	3.1			46	2.7	25	0.74	34	1.4			59	2.14
91-92	15	2.46	33	2.8			48	2.69	33	0.97	45	1.89			78	2.84
92-93	13	2.19	36	3.3	1	11.6	50	2.93	17	0.45	22	0.96	1		40	1.42
5-yr. Total	66	2.25	173	3	1	2.32	240	2.71	117	0.69	148	1.2	2		267	1.93
93-94	23	3.78	17	1.9			40	2.66	28	0.72	8	0.42			36	1.14
94-95	38	4.87	10	1.3	1	9.93	49	3.17	24	0.57	7	0.39			31	0.96
95-96	13	1.55	7	0.9			20	1.24	27	0.60	8	0.45			35	1.04
96-97	13	1.47	5	0.7			18	1.14	27	0.58	2	0.16			29	0.69
97-98	10	1.01	4	0.8			14	0.67	43	0.88	10	0.59			53	1.47
5-yr. Total	97	2.54	43	1.1			141	1.78	149	0.67	35	0.4	0		184	1.06

YEAR	SOUTH CENTRAL								SOUTH-EASTERN							
	BG		MG		NG		TOTAL		BG		MG		NG		TOTAL	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
88-89	26	0.56	11	0.58			37	0.562	63	1.06			3	6.04	66	1.1
89-90	30	0.65	13	0.666			43	0.655	112	1.75					112	
90-91	38	0.79	15	0.774			53	0.786	96	1.46			1	1.99	97	1.46
91-92	39	0.78	16	0.82			55	0.792	269	1.05			18	3.37	287	1.07

92-93	37	0.71	8	0.446			45	0.644	208	3			12	24.94	220	3.16
5-yr. Total	170	0.70	63	0.657	0		233	0.69	748	1.66	0		34	7.27	782	1.36
93-94	37	0.66	10	0.634			47	0.654	163	2.22			5	11.28	168	2.28
94-95	30	0.49	9	0.697			39	0.523	132	1.68			3	6.75	135	1.71
95-96	25	0.38	2	0.262			27	0.37	82	0.95			2	4.98	84	0.97
96-97	30	0.44	1	0.141			31	0.409	74	0.85					74	0.85
97-98	28	0.4	2	0.395			30	0.396	64	0.73					64	0.73
5-yr. Total	150	0.47	24	0.426	0		174	0.47	515	1.29	0		10	4.6	525	1.31

YEAR	**SOUTH CENTRAL**								**SOUTH-EASTERN**							
	BG		**MG**		**NG**		**TOTAL**		**BG**		**MG**		**NG**		**TOTAL**	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
88-89	17	0.18	30	0.3			47	0.5							0	
89-90	19	0.17	24	0.2			43	0.4							0	
90-91	14	0.14	25	0.3			39	0.4							0	
91-92	20	0.22	19	0.2			39	0.4							0	
92-93	27	0.27	13	0.1			40	0.4							0	
5-yr. Total	97	0.20	111	0.2	0		208	0.42	0		0		0		0	
93-94	24	0.22	17	0.2			41	0.4							0	
94-95	36	0.35	5	0.1			41	0.4							0	
95-96	23	0.22	8	0.1			31	0.30							0	
96-97	28	0.25	5	0.1			33	0.3	1	1.4					1	1.4

97-98	25	0.19	1	0			26	0.2	1	1.3					1	1.3
5-yr. Total	136	0.25	36	0.1	0		172	0.32	2	0.54	0		0		2	0.54

YEAR	**KRC**								**TOTAL**							
	BG		**MG**		**NG**		**TOTAL**		**BG**		**MG**		**NG**		**TOTAL**	
	A	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
88-89							0		317	0.68	132	1.06	8	0.86	457	0.76
89-90							0		339	0.71	114	0.89	4	0.42	457	0.74
90-91							0		318	0.66	126	1	1	0.1	445	0.72
91-92							0		505	1.02	131	1.02	19	2.08	655	1.04
92-93							0		459	0.91	139	1.14	15	1.64	613	0.97
5-yr. Total	0		0		0		0		1938	0.80	642	1.03	47	0.96	2627	0.85
93-94							0		455	0.88	84	0.79	8	0.92	547	0.86
94-95							0		439	0.81	43	0.46	5	0.6	487	0.76
95-96							0		302	0.53	32	0.38	2	0.25	336	0.51
96-97	3						3		308	0.53	20	0.25	0	0	328	0.49
97-98	3						3		287	0.47	26	0.38	2	0.27	315	0.46
5-yr. Total	6		0		0		6		1791	0.64	205	0.47	17	0.43	2013	0.61

Annexure – 17

Derailments at Stations and in mid -section according to main cause – Gauge-wise & Railway – wise in 5- year blocks

P = Passenger Trains O=other T=Total A= No. of derailments B = No. of derailments due to cause taken as a %age to total

Period	Causes	Type	CR				ER			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailments at stations									
1988-89 to 1992-93	1-staff failure	P	20	0	0	20	35	0	0	35
		O	44	0	0	44	61	0	0	61
		T	64	0	0	64	96	0	0	96
	2- Permanent Way failure	P	0	0	0	0	2	0	0	2
		O	3	0	0	3	4	0	0	4
		T	3	0	0	3	6	0	0	6
	3- Carriage and wagon defects	P	0	0	0	0	1	0	0	1
		O	6	0	0	6	12	0	0	12
		T	6	0	0	6	13	0	0	13
	4- Engine defects	P	0	0	0	0	0	0	0	0
		O	0	0	0	0	1	0	0	1
		T	0	0	0	0	1	0	0	1
	5- Miscellaneous causes	P	1	0	0	1	5	0	0	5
		O	5	0	0	5	9	0	0	9
		T	6	0	0	6	14	0	0	14

	6- Total	P	21	0	0	21	43	0	0	43
		O	58	0	0	58	87	0	0	87
		T	79	0	0	79	130	0	0	130

Period	**Causes**	**Type**	**NR**				**NE**			
			BG	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
	Derailments at stations									
1988-89 to 1992-93	1-staff failure	P	7	1	0	8	2	3	0	5
		O	10	0	0	10	2	2	0	4
		T	17	1	0	18	4	5	0	9
	2- Permanent Way failure	P	15	0	0	15	0	1	0	1
		O	13	1	0	14	2	1	0	3
		T	28	1	0	29	2	2	0	4
	3- Carriage and wagon defects	P	11	2	0	13	0	8	0	8
		O	46	4	0	50	6	2	0	8
		T	57	6	0	63	6	10	0	16
	4- Engine defects	P	3	2	0	5	0	1	0	1
		O	0	0	0	0	0	2	0	2
		T	3	2	0	5	0	3	0	3
	5- Miscellaneous causes	P	7	1	0	8	0	0	0	0
		O	5	1	0	6	0	1	0	1
		T	12	2	0	14	0	1	0	1
	6- Total	P	43	6	0	49	2	13	0	15
		O	74	6	0	80	10	8	0	18
		T	117	12	0	129	12	21	0	33

Period	Causes	Type	NF				SR			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailments at stations									
1988-89 to 1992-93	1-staff failure	P	7	13	0	20	4	1	0	5
		O	13	18	0	31	8	6	0	14
		T	20	31	0	51	12	7	0	19
	2- Permanent Way failure	P	0	1	0	1	4	3	0	7
		O	6	1	0	7	1	1	0	2
		T	6	2	0	8	5	4	0	9
	3- Carriage and wagon defects	P	0	0	0	0	2	2	0	4
		O	3	6	0	9	8	5	0	13
		T	3	6	0	9	10	7	0	17
	4- Engine defects	P	0	0	0	0	0	0	0	0
		O	0	0	0	0	0	0	0	0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	1	1	0	2	0	1	0	1
		O	3	0	0	3	0	0	0	0
		T	4	1	0	5	0	1	0	1
	6- Total	P	8	15	0	23	10	7	0	17
		O	25	25	0	50	17	12	0	29
		T	33	40	0	73	27	19	0	46

Period	Causes	Type	CR				ER			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailments in mid-section									
1988-89 to 1992-93	1-staff failure	P	14	0	3	17	5	0	0	5
		O	76	0	1	77	72	0	0	72
		T	90	0	4	94	77	0	0	77
	2- Permanent Way failure	P	5	0	0	5	3	0	0	3
		O	3	0	0	3	8	0	0	8
		T	8	0	0	8	11	0	0	11
	3- Carriage and wagon defects	P	1	0	0	1	1	0	0	1
		O	15	0	0	15	10	0	0	10
		T	16	0	0	16	11	0	0	11
	4- Engine defects	P	1	0	0	1	1	0	0	1
		O	0	0	0	0	0	0	0	0
		T	1	0	0	1	1	0	0	1
	5- Miscellaneous causes	P	7	0	4	11	6	0	0	6
		O	3	0	0	3	18	0	0	18
		T	10	0	4	14	24	0	0	24
	6- Total	P	28	0	7	35	16	0	0	16
		O	97	0	1	98	108	0	0	108
		T	125	0	8	133	124	0	0	124

Period	Causes	Type	NR				NE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailments in mid-section									
1988-89 to 1992-93	1-staff failure	P	4	1	1	6	0	5	0	5
		O	7	8	0	15	0	3	0	3
		T	11	9	1	21	0	8	0	8
	2- Permanent Way failure	P	16	2	0	18	3	1	0	4
		O	29	7	0	36	2	6	0	8
		T	45	9	0	54	5	7	0	12
	3- Carriage and wagon defects	P	5	8	1	14	1	2	0	3
		O	53	23	0	76	5	23	0	28
		T	58	31	1	90	6	25	0	31
	4- Engine defects	P	0	0	0	0	0	4	0	4
		O	0	0	0	0	0	0	0	0
		T	0	0	0	0	0	4	0	4
	5- Miscellaneous causes	P	10	1	0	11	1	2	0	3
		O	13	13	0	26	4	5	0	9
		T	23	14	0	37	5	7	0	12
	6- Total	P	35	12	2	49	5	14	0	19
		O	102	51	0	153	11	37	0	48
		T	137	63	2	202	16	51	0	67

Period	Causes	Type	NF				SR			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailments in mid-section									
1988-89 to 1992-93	1-staff failure	P	3	12	0	15	2	2	0	4
		O	15	56	0	71	9	21	0	30
		T	18	68	0	86	11	23	0	34
	2- Permanent Way failure	P	0	1	0	1	0	5	0	5
		O	1	3	0	4	10	16	0	26
		T	1	4	0	5	10	21	0	31
	3- Carriage and wagon defects	P	0	2	0	2	1	3	0	4
		O	2	31	0	33	20	26	0	46
		T	2	33	0	35	21	29	0	50
	4- Engine defects	P	0	0	0	0	0	0	0	0
		O	0	0	0	0	0	1	0	1
		T	0	0	0	0	0	1	0	1
	5- Miscellaneous causes	P	7	11	1	19	1	2	1	4
		O	5	17	0	22	5	6	0	11
		T	12	28	1	41	6	8	1	15
	6- Total	P	10	26	1	37	4	12	1	17
		O	23	107	0	130	44	70	0	114
		T	33	133	1	167	48	82	1	131

Period	Causes	Type	CR				ER			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	All Derailment									
1988-89 to 1992-93	1-staff failure	P	34	0	3	37	40	0	0	40
		O	120	0	1	121	133	0	0	133
		T	154	0	4	158	173	0	0	173
	2- Permanent Way failure	P	5	0	0	5	5	0	0	5
		O	6	0	0	6	12	0	0	12
		T	11	0	0	11	17	0	0	17
	3- Carriage and wagon defects	P	1	0	0	1	2	0	0	2
		O	21	0	0	21	22	0	0	22
		T	22	0	0	22	24	0	0	24
	4- Engine defects	P	1	0	0	1	1	0	0	1
		O	0	0	0	0	1	0	0	1
		T	1	0	0	1	2	0	0	2
	5- Miscellaneous causes	P	8	0	4	12	11	0	0	11
		O	8	0	0	8	27	0	0	27
		T	16	0	4	20	38	0	0	38
	6- Total	P	49	0	7	56	59	0	0	59
		O	155	0	1	156	195	0	0	195
		T	204	0	8	212	254	0	0	254

Period	Causes	Type	NR				NE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	All Derailment									
1988-89 to 1992-93	1-staff failure	P	11	2	1	14	2	8	0	10
		O	17	8	0	25	2	5	0	7
		T	28	10	1	39	4	13	0	17
	2- Permanent Way failure	P	31	2	0	33	3	2	0	5
		O	42	8	0	50	4	7	0	11
		T	73	10	0	83	7	9	0	16
	3- Carriage and wagon defects	P	16	10	1	27	1	10	0	11
		O	99	27	0	126	11	25	0	36
		T	115	37	1	153	12	35	0	47
	4- Engine defects	P	3	2	0	5	0	5	0	5
		O	0	0	0	0	0	2	0	2
		T	3	2	0	5	0	7	0	7
	5- Miscellaneous causes	P	17	2	0	19	1	2	0	3
		O	18	14	0	32	4	6	0	10
		T	35	16	0	51	5	8	0	13
	6- Total	P	78	18	2	98	7	27	0	34
		O	176	57	0	233	21	45	0	66
		T	254	75	2	331	28	72	0	100

Period	Causes	Type	NF				SR			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	All Derailment									
1988-89 to 1992-93	1-staff failure	P	10	25	0	35	6	3	0	9
		O	28	74	0	102	17	27	0	44
		T	38	99	0	137	23	30	0	53
	2- Permanent Way failure	P	0	2	0	2	4	8	0	12
		O	7	4	0	11	11	17	0	28
		T	7	6	0	13	15	25	0	40
	3- Carriage and wagon defects	P	0	2	0	2	3	5	0	8
		O	5	37	0	42	28	31	0	59
		T	5	39	0	44	31	36	0	67
	4- Engine defects	P	0	0	0	0	0	0	0	0
		O	0	0	0	0	0	1	0	1
		T	0	0	0	0	0	1	0	1
	5- Miscellaneous causes	P	8	12	1	21	1	3	1	15
		O	8	17	0	25	5	6	0	11
		T	16	29	1	46	6	9	1	16
	6- Total	P	18	41	1	60	14	19	1	34
		O	48	132	0	180	61	82	0	143
		T	66	173	1	240	75	101	1	177

Southern and south-eastern Railway have not furnished details of derailments for the period 88-89 to 92-93 respectively.

Contd./-

Annexure – 17 (Contd.)

Derailments at Stations and in mid -section according to main cause – Gauge-wise & Railway – wise in 5- year blocks

P = Passenger Trains O=other T=Total A= No. of derailments B = No. of derailments due to cause taken as a %age to total

Period	Causes	Type	SC				SE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment at station									
1988-89 to 1992-93	1-staff failure	P	9	3	0	12	0	0	0	0
		O	40	7	0	47	0	0	0	0
		T	49	10	0	59	0	0	0	0
	2- Permanent Way failure	P	4	1	0	5	0	0	0	0
		O	1	0	0	1	0	0	0	0
		T	5	1	0	6	0	0	0	0
	3- Carriage and wagon defects	P	1	0	0	1	0	0	0	0
		O	8	2	0	10	0	0	0	0
		T	9	2	0	11	0	0	0	0
	4- Engine defects	P	0	0	0	0	0	0	0	0
		O	0	0	0	0	0	0	0	0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	1	1	0	2	0	0	0	0
		O	0	0	0	0	0	0	0	0
		T	1	1	0	2	0	0	0	0

	6- Total	P	15	5	0	20	0	0	0	0
		O	49	9	0	58	0	0	0	0
		T	64	14	0	78	0	0	0	0

Period	**Causes**	**Type**	**WR**				**METRO**			
			BG	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
	Derailment at station									
1988-89 to 1992-93	1-staff failure	P	8	9	0	17	0	0	0	0
		O	19	9	0	28	0	0	0	0
		T	27	18	0	45	0	0	0	0
	2- Permanent Way failure	P	2	0	0	2	0	0	0	0
		O	0	0	0	0	0	0	0	0
		T	2	0	0	2	0	0	0	0
	3- Carriage and wagon defects	P	0	0	0	0	0	0	0	0
		O	2	6	0	8	0	0	0	0
		T	2	6	0	8	0	0	0	0
	4- Engine defects	P	0	0	0	0	0	0	0	0
		O	0	0	0	0	0	0	0	0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	0	0	0	0	0	0	0	0
		O	5	2	0	7	0	0	0	0
		T	5	2	0	7	0	0	0	0
	6- Total	P	10	9	0	19	0	0	0	0
		O	26	17	0	43	0	0	0	0
		T	36	26	0	62	0	0	0	0

Period	Causes	Type	KRC							
			BG		MG		NG		TOTAL	
	Derailment at station									
1988-89 to 1992-93	1-staff failure	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	2- Permanent Way failure	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	3- Carriage and wagon defects	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	4- Engine defects	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	5- Miscellaneous causes	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	6- Total	P	0		0		0		0	
		O	0		0		0		0	
		T								

Period	Causes	Type	ALL INDIAN RAILWAYS							
			BG		MG		NG		TOTAL	
	Derailment at station		**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
1988-89 to 1992-93	1-staff failure	P	92	60.5	30	54.5	0		122	58.9
		O	197	56.9	42	54.5	0		239	56.5
		T	289	58.0	72	54.5	0		361	57.3
	2- Permanent Way failure	P	27	17.8	6	10.9	0		33	15.9
		O	30	8.7	4	5.2	0		34	8.0
		T	57	11.4	10	7.6	0		67	10.6
	3- Carriage and wagon defects	P	15	9.9	12	21.8	0		27	13.0
		O	91	26.3	25	32.5	0		116	27.4
		T	106	21.3	37	28.0	0		143	22.7
	4- Engine defects	P	3	2.0	3	5.5	0		6	2.9
		O	1	0.3	2	2.6	0		3	0.7
		T	4	0.8	5	3.8	0		9	1.4
	5- Miscellaneous causes	P	15	9.9	4	7.3	0		19	9.2
		O	27	7.8	4	5.2	0		31	7.3
		T	42	8.4	8	6.1	0		50	7.9
	6- Total	P	152	30.5	55	41.7	0		207	32.9
		O	346	69.5	77	58.3	0		423	67.1
		T	498	100	132	100	0		630	100

Period	Causes	Type	SC				SE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment in mid-section									
1988-89 to 1992-93	1-staff failure	P	20	9	0	29	0	0	0	0
		O	48	24	0	72	0	0	0	0
		T	68	33	0	101	0	0	0	0
	2- Permanent Way failure	P	7	1	0	8	0	0	0	0
		O	4	0	0	4	0	0	0	0
		T	11	1	0	12	0	0	0	0
	3- Carriage and wagon defects	P	2	0	0	2	0	0	0	0
		O	10	6	0	16	0	0	0	0
		T	12	6	0	18	0	0	0	0
	4- Engine defects	P	0	0	0	0	0	0	0	0
		O	0	0	0	0	0	0	0	0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	8	5	0	13	0	0	0	0
		O	7	4	0	11	0	0	0	0
		T	15	9	0	24	0	0	0	0
	6- Total	P	37	15	0	52	0	0	0	0
		O	69	34	0	103	0	0	0	0
		T	106	49	0	155	0	0	0	0

Period	Causes	Type	WR				METRO			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment at station									
1988-89 to 1992-93	1-staff failure	P	7	12	0	19	0	0	0	0
		O	42	50	0	92	0	0	0	0
		T	49	62	0	111	0	0	0	0
	2- Permanent Way failure	P	1	2	0	3	0	0	0	0
		O	4	0	0	4	0	0	0	0
		T	5	2	0	7	0	0	0	0
	3- Carriage and wagon defects	P	0	1	0	1	0	0	0	0
		O	3	10	0	13	0	0	0	0
		T	3	11	0	14	0	0	0	0
	4- Engine defects	P	0	1	0	1	0	0	0	0
		O	0	0	0	0	0	0	0	0
		T	0	1	0	1	0	0	0	0
	5- Miscellaneous causes	P	1	0	0	1	0	0	0	0
		O	3	9	0	12	0	0	0	0
		T	4	9	0	13	0	0	0	0
	6- Total	P	9	16	0	25	0	0	0	0
		O	52	69	0	121	0	0	0	0
		T	61	85	0	146	0	0	0	0

Period	Causes	Type	KRC							
			BG		MG		NG		TOTAL	
	All Derailment									
1988-89 to 1992-93	1-staff failure	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	2- Permanent Way failure	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	3- Carriage and wagon defects	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	4- Engine defects	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	5- Miscellaneous causes	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	6- Total	P	0		0		0		0	
		O	0		0		0		0	
		T								

Period	Causes	Type	ALL INDIAN RAILWAYS							
			BG		MG		NG		TOTAL	
	Derailment at station		A	B	A	B	A	B	A	B
1988-89 to 1992-93	1-staff failure	P	55	38.2	41	43.2	4	36.4	100	40.0
		O	269	53.2	162	44.0	1	100	432	49.4
		T	324	49.8	203	43.8	5	41.7	532	47.3
	2- Permanent Way failure	P	35	24.3	12	12.6	0	0.0	47	18.8
		O	61	12.1	32	8.7	0	0.0	93	10.6
		T	96	14.8	44	9.5	0	0.0	140	12.4
	3- Carriage and wagon defects	P	11	7.6	16	16.8	1	9.1	28	11.2
		O	118	23.3	119	32.3	0	0.0	237	27.1
		T	129	19.8	135	29.2	1	8.3	265	23.6
	4- Engine defects	P	2	1.4	5	5.3	0	0.0	7	2.8
		O	0	0.0	1	0.3	0	0.0	1	0.1
		T	2	0.3	6	1.3	0	0.0	8	0.7
	5- Miscellaneous causes	P	41	28.5	21	22.1	6	54.5	68	27.2
		O	58	11.5	54	14.7	0	0.0	112	12.8
		T	99	15.2	75	16.2	6	50.0	180	16.0
	6- Total	P	144	22.2	95	20.5	11	91.7	250	22.2
		O	506	77.8	368	79.5	1	8.3	875	77.8
		T	650	100	463	100	12	100	1125	100

Period	Causes	Type	SC				SE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	All Derailment									
1988-89 to 1992-93	1-staff failure	P	29	12	0	41	0	0	0	0
		O	88	31	0	119	0	0	0	0
		T	117	43	0	160	0	0	0	0
	2- Permanent Way failure	P	11	2	0	13	0	0	0	0
		O	5	0	0	5	0	0	0	0
		T	16	2	0	18	0	0	0	0
	3- Carriage and wagon defects	P	3	0	0	3	0	0	0	0
		O	18	8	0	26	0	0	0	0
		T	21	8	0	29	0	0	0	0
	4- Engine defects	P	0	0	0	0	0	0	0	0
		O	0	0	0	0	0	0	0	0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	9	6	0	15	0	0	0	0
		O	7	4	0	11	0	0	0	0
		T	16	10	0	26	0	0	0	0
	6- Total	P	52	20	0	72	0	0	0	0
		O	118	43	0	161	0	0	0	0
		T	170	63	0	233	0	0	0	0

Period	Causes	Type	WR				METRO			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	All Derailment									
1988-89 to 1992-93	1-staff failure	P	15	21	0	36	0	0	0	0
		O	61	59	0	120	0	0	0	0
		T	76	80	0	156	0	0	0	0
	2- Permanent Way failure	P	3	2	0	5	0	0	0	0
		O	4	0	0	4	0	0	0	0
		T	7	2	0	9	0	0	0	0
	3- Carriage and wagon defects	P	0	1	0	1	0	0	0	0
		O	5	16	0	21	0	0	0	0
		T	5	17	0	22	0	0	0	0
	4- Engine defects	P	0	1	0	1	0	0	0	0
		O	0	0	0	0	0	0	0	0
		T	0	1	0	1	0	0	0	0
	5- Miscellaneous causes	P	1	0	0	1	0	0	0	0
		O	8	11	0	19	0	0	0	0
		T	9	11	0	20	0	0	0	0
	6- Total	P	19	25	0	44	0	0	0	0
		O	78	86	0	164	0	0	0	0
		T	97	111	0	208	0	0	0	0

Period	Causes	Type	KRC							
			BG		MG		NG		TOTAL	
	All Derailment									
1988-89 to 1992-93	1-staff failure	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	2- Permanent Way failure	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	3- Carriage and wagon defects	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	4- Engine defects	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	5- Miscellaneous causes	P	0		0		0		0	
		O	0		0		0		0	
		T	0		0		0		0	
	6- Total	P	0		0		0		0	
		O	0		0		0		0	
		T								

Period	Causes	Type	ALL INDIAN RAILWAYS							
			BG		MG		NG		TOTAL	
	All Derailment		A	B	A	B	A	B	A	B
1988-89 to 1992-93	1-staff failure	P	147	49.7	71	47.3	4	36.4	222	48.6
		O	466	54.7	204	45.8	1	100	671	51.7
		T	613	53.4	275	46.2	5	41.7	893	50.9
	2- Permanent Way failure	P	62	20.9	18	12.0	0	0.0	80	17.5
		O	91	10.7	36	8.1	0	0.0	127	9.8
		T	153	13.3	54	9.1	0	0.0	207	11.8
	3- Carriage and wagon defects	P	26	8.8	28	18.7	1	9.1	55	12.0
		O	209	24.5	144	32.4	0	0.0	353	27.2
		T	235	20.5	172	28.9	1	8.3	408	23.2
	4- Engine defects	P	5	1.7	8	5.3	0	0.0	13	2.8
		O	1	0.1	3	0.7	0	0.0	4	0.3
		T	6	0.5	11	1.8	0	0.0	17	1.0
	5- Miscellaneous causes	P	56	18.9	25	16.7	6	54.5	87	19.0
		O	85	10.0	58	13.0	0	0.0	143	11.0
		T	141	12.3	83	13.9	6	50.0	230	13.1
	6- Total	P	296	25.8	150	25.2	11	91.7	457	26.0
		O	852	74.2	445	74.8	1	8.3	1298	74.0
		T	1148	100	595	100	12	100	1755	100

Period	Causes	Type	CR				ER			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment at station									
1993-89 to 1997-98	1-staff failure	P	20			20	21			21
		O	46			46	46			46
		T	66	0	0	66	67	0	0	67
	2- Permanent Way failure	P	3			3	2			2
		O	1			1	2			2
		T	4	0	0	4	4	0	0	4
	3- Carriage and wagon defects	P				0				0
		O	8			8	1			1
		T	8	0	0	8	1	0	0	1
	4- Engine defects	P				0				0
		O				0				0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	2			2	6			6
		O	3			3	4			4
		T	5	0	0	5	10	0	0	10
	6- Total	P	25	0	0	25	29	0	0	29
		O	58	0	0	58	53	0	0	53
		T	83	0	0	83	82	0	0	82

Period	Causes	Type	NR				NE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment at station									
1993-89 to 1997-98	1-staff failure	P	12	0		12	4	2	0	6
		O	29	0		29	0	1	0	1
		T	41	0	0	41	4	3	0	7
	2- Permanent Way failure	P	7	0		7	1	4	0	5
		O	14	1		15	1	0	0	1
		T	21	1	0	22	2	4	0	6
	3- Carriage and wagon defects	P	9	1		10	0	1	0	1
		O	74	1		75	5	3	0	8
		T	83	2	0	85	5	4	0	9
	4- Engine defects	P	3	0		3	1	1	0	2
		O	2	0		2	1	0	0	1
		T	5	0	0	5	2	1	0	3
	5- Miscellaneous causes	P	8	2		10	1	0	0	1
		O	21			21	4	0	0	4
		T	29	2	0	31	5	0	0	5
	6- Total	P	39	3	0	42	7	8	0	15
		O	140	2	0	142	11	4	0	15
		T	179	5	0	184	18	12	0	30

Period	Causes	Type	NF				SR			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment at station									
1993-89 to 1997-98	1-staff failure	P	11	6		17	5	1		6
		O	28	4		32	12	1		13
		T	39	10	0	49	17	2	0	19
	2- Permanent Way failure	P				0	4	3		7
		O	1			1	17	1		18
		T	1	0	0	1	21	4	0	25
	3- Carriage and wagon defects	P				0	3			3
		O	6	2		8	23	1		24
		T	6	2	0	8	26	1	0	27
	4- Engine defects	P				0				0
		O				0	3	1		4
		T	0	0	0	0	3	1	0	4
	5- Miscellaneous causes	P		2		2	2	2		4
		O				0	3			3
		T	0	2	0	2	5	2	0	7
	6- Total	P	11	8	0	19	14	6	0	20
		O	35	6	0	41	58	4	0	62
		T	46	14	0	60	72	10	0	82

Period	Causes	Type	CR				ER			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment in-mid-section									
1993-89 to 1997-98	1-staff failure	P	23			23	15			15
		O	80			80	16			16
		T	103	0	0	103	31	0	0	31
	2- Permanent Way failure	P	6			6	3			3
		O	5			5				0
		T	11	0	0	11	3	0	0	3
	3- Carriage and wagon defects	P	2			2			1	1
		O	11			11	1			1
		T	13	0	0	13	1	0	1	2
	4- Engine defects	P				0	1			1
		O				0	0			0
		T	0	0	0	0	1	0	0	1
	5- Miscellaneous causes	P	4			4	9			9
		O	6			6	3			3
		T	10	0	0	10	12	0	0	12
	6- Total	P	35	0	0	35	28	0	1	29
		O	120	0	0	102	20	0	0	20
		T	137	0	0	137	48	0	1	49

Period	Causes	Type	NR				NE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment in-mid-section									
1993-89 to 1997-98	1-staff failure	P	2	0	1	3	1	0	0	1
		O	9	0	0	9	0	1	0	1
		T	11	0	1	12	1	1	0	2
	2- Permanent Way failure	P	16	5	0	21	7	7		14
		O	32	2	0	34	2	2		4
		T	48	7	0	55	9	9	0	18
	3- Carriage and wagon defects	P	4	1	1	6	3	2		5
		O	59	10	0	69	6	5		11
		T	63	11	1	75	9	7	0	16
	4- Engine defects	P	1	0	0	1	0	1		1
		O		1	0	1	1	1		2
		T	1	1	0	2	1	2	0	3
	5- Miscellaneous causes	P	17	4	3	24	6	6		12
		O	22	2	0	24	1			1
		T	39	6	3	48	7	6	0	13
	6- Total	P	40	10	5	55	17	16	0	33
		O	122	15	0	137	10	9	0	19
		T	162	25	5	192	27	25	0	52

Period	Causes	Type	NF				SR			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment in-mid-section									
1993-89 to 1997-98	1-staff failure	P	8	3		11				0
		O	27	13	1	41	10	1		11
		T	35	16	1	52	10	1	0	11
	2- Permanent Way failure	P	1	1		2	4	9		13
		O	3			3	18	6		24
		T	4	1	0	5	22	15	0	37
	3- Carriage and wagon defects	P				0	1	2		3
		O	4			4	33	4		37
		T	4	0	0	4	34	6	0	40
	4- Engine defects	P				0				0
		O				0				0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	3	7		10	2	1		3
		O	5	5		10	9	2		11
		T	8	12	0	20	11	3	0	14
	6- Total	P	12	11	0	23	7	12	0	19
		O	39	18	1	58	70	13	0	83
		T	51	29	1	81	77	25	0	102

Period	Causes	Type	CR				ER			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment in-mid-section									
1993-89 to 1997-98	1-staff failure	P	43	0	0	43	36	0	0	36
		O	126	0	0	126	62	0	0	62
		T	169	0	0	169	98	0	0	98
	2- Permanent Way failure	P	9	0	0	9	5	0	0	5
		O	6	0	0	6	2	0	0	2
		T	15	0	0	15	7	0	0	7
	3- Carriage and wagon defects	P	2	0	0	2	0	0	1	1
		O	19	0	0	19	2	0	0	2
		T	21	0	0	21	2	0	1	3
	4- Engine defects	P	0	0	0	0	1	0	0	1
		O	0	0	0	0	0	0	0	0
		T	0	0	0	0	1	0	0	1
	5- Miscellaneous causes	P	6	0	0	6	15	0	0	15
		O	9	0	0	9	7	0	0	7
		T	15	0	0	15	22	0	0	22
	6- Total	P	60	0	0	60	57	0	1	58
		O	160	0	0	160	73	0	0	73
		T	220	0	0	220	130	0	1	131

Period	Causes	Type	NR				NE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment in-mid-section									
1993-89 to 1997-98	1-staff failure	P	14	0	1	15	5	2	0	7
		O	38	0	0	38	0	2	0	2
		T	52	0	1	53	5	4	0	9
	2- Permanent Way failure	P	23	5	0	28	8	11	0	19
		O	46	3	0	49	3	2	0	5
		T	69	8	0	77	11	13	0	24
	3- Carriage and wagon defects	P	13	2	1	16	3	3	0	6
		O	133	11	0	144	11	8	0	19
		T	146	13	1	160	14	11	0	25
	4- Engine defects	P	4	0	0	4	1	2	0	3
		O	2	1	0	3	2	1	0	3
		T	6	1	0	7	3	3	0	6
	5- Miscellaneous causes	P	25	6	3	34	7	6	0	13
		O	43	2	0	45	5	0	0	5
		T	68	8	3	79	12	6	0	18
	6- Total	P	79	13	5	97	24	24	0	48
		O	262	17	0	279	21	13	0	34
		T	341	30	5	376	45	37	0	82

Period	Causes	Type	NR				NE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment in-mid-section									
1993-89 to 1997-98	1-staff failure	P	19	9	0	28	5	1	0	6
		O	55	17	1	73	22	2	0	24
		T	74	26	1	101	27	3	0	30
	2- Permanent Way failure	P	1	1	0	2	8	12	0	20
		O	4	0	0	4	35	7	0	42
		T	5	1	0	5	43	19	0	62
	3- Carriage and wagon defects	P	0	0	0	0	4	2	0	6
		O	10	2	0	12	56	5	0	61
		T	10	2	0	12	60	7	0	67
	4- Engine defects	P	0	0	0	0	0	0	0	0
		O	0	0	0	0	3	1	0	4
		T	0	0	0	0	3	1	0	4
	5- Miscellaneous causes	P	3	9	0	12	4	3	0	7
		O	5	5	0	10	12	2	0	14
		T	8	14	0	22	16	5	0	21
	6- Total	P	23	19	0	42	21	18	0	39
		O	74	24	1	99	128	17	0	145
		T	97	43	1	141	149	35	0	184

Contd..... /-

Annexure – 17 (Contd.)

Derailments at Stations and in mid -section according to main cause – Gauge-wise & Railway – wise in 5- year blocks

P = Passenger Trains O=other T=Total A= No. of derailments B = No. of derailments due to cause taken as a % age to total

Period	Causes	Type	SC				SE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment in-mid-section									
1993-89 to 1997-98	1-staff failure	P	11	3		14	41		1	42
		O	41	2		43	124			124
		T	52	5	0	57	165	0	1	166
	2- Permanent Way failure	P	2			2	2			2
		O	2			2	3			3
		T	4	0	0	4	5	0	0	5
	3- Carriage and wagon defects	P				0				0
		O	5	1		6	5			5
		T	5	1	0	6	5	0	0	5
	4- Engine defects	P				0				0
		O				0				0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	5	1		6	5			5
		O	4	1		5	5			5
		T	9	2	0	11	10	0	0	10
	6- Total	P	18	4	0	22	48	0	1	49

		O	52	4	0	56	137	0	0	137
		T	70	8	0	78	185	0	1	186

Period	**Causes**	**Type**	**WR**				**METRO**			
			BG	**MG**	**NG**	**TOTAL**	**BG**	**MG**	**NG**	**TOTAL**
	Derailment in-mid-section									
1993-89 to 1997-98	1-staff failure	P	17	2		19				0
		O	30	3		33				0
		T	47	5	0	52	0	0	0	0
	2- Permanent Way failure	P	3	1		4				0
		O	1			1				0
		T	4	1	0	5	0	0	0	0
	3- Carriage and wagon defects	P	1			1				0
		O	2	1		3				0
		T	3	1	0	4	0	0	0	0
	4- Engine defects	P				0				0
		O				0				0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	1		0	1				0
		O	5		0	5				0
		T	6	0	0	6	0	0	0	0
	6- Total	P	22	3	0	25	0	0	0	0
		O	38	4	0	42	0	0	0	0
		T	60	7	0	67	0	0	0	0

Period	Causes	Type	KRC			
			BG	MG	NG	TOTAL
	Derailment in-mid-section					
1993-89 to 1997-98	1-staff failure	P				0
		O				0
		T	0	0	0	0
	2- Permanent Way failure	P				0
		O				0
		T	0	0	0	0
	3- Carriage and wagon defects	P				0
		O				0
		T	0	0	0	0
	4- Engine defects	P				0
		O				0
		T	0	0	0	0
	5- Miscellaneous causes	P				0
		O				0
		T	0	0	0	0
	6- Total	P	0	0	0	0
		O	0	0	0	0
		T	0	0	0	0

Period	Causes	Type	ALL INDIAN RAILWAYS							
			BG		MG		NG		TOTAL	
	All Derailment		A	B	A	B	A	B	A	B
1988-89 to 1992-93	1-staff failure	P	142	66.7	14	43.8	1	100	157	63.8
		O	356	61.2	11	45.8	0		367	60.6
		T	498	62.6	25	44.6	1	100	524	61.5
	2- Permanent Way failure	P	24	11.3	8	25.0	0	0	32	13.0
		O	42	7.2	2	8.3	0		44	7.3
		T	66	8.3	10	17.9	0	0	76	8.9
	3- Carriage and wagon defects	P	13	6.1	2	6.3	0	0	15	6.1
		O	129	22.2	9	37.5	0		138	22.8
		T	142	17.9	11	19.6	0	0	153	18.0
	4- Engine defects	P	4	1.9	1	3.1	0	0	5	2.0
		O	6	1.0	1	4.2	0		7	1.2
		T	10	1.3	2	3.6	0	0	12	1.4
	5- Miscellaneous causes	P	30	14.1	7	21.9	0	0	37	15.0
		O	49	8.4	1	4.2	0		50	8.3
		T	79	9.9	8	14.3	0	0	87	10.2
	6- Total	P	213	26.8	32	57.1	1	100	246	28.9
		O	582	73.2	24	42.9	0	0	606	71.1
		T	795	100	56	100	1	100	852	100

Period	Causes	Type	SC				SE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment in-mid-section									
1993-89 to 1997-98	1-staff failure	P	11	4		15	24		2	26
		O	47	4		51	190		1	191
		T	58	8	0	66	214	0	3	217
	2- Permanent Way failure	P	3	0		3	10			10
		O	5	1		6	37			37
		T	8	1	0	9	47	0	0	47
	3- Carriage and wagon defects	P				0	1			1
		O	3	1		4	14		1	15
		T	3	1	0	4	15	0	1	16
	4- Engine defects	P				0				0
		O				0				0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	9	4		13	14		4	18
		O	2	2		4	40		1	41
		T	11	6	0	17	54	0	5	59
	6- Total	P	23	8	0	31	49	0	6	55
		O	57	8	0	65	281	0	3	284
		T	80	16	0	96	330	0	9	339

Period	Causes	Type	WR				SE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
	Derailment in-mid-section									
1993-89 to 1997-98	1-staff failure	P	15	8		23				0
		O	44	16		60				0
		T	59	24	0	83	0	0	0	0
	2- Permanent Way failure	P	4			4	2			2
		O	4			4				0
		T	8	0	0	8	2	0	0	2
	3- Carriage and wagon defects	P				0				0
		O	4	2		6				0
		T	4	2	0	6	0	0	0	0
	4- Engine defects	P				0				0
		O				0				0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P				0				0
		O	5	3		8				0
		T	5	3	3	8	0	0	0	0
	6- Total	P	19	8	3	27	2	0	0	2
		O	57	21	8	78	0	0	0	0
		T	76	29	21	105	2	0	0	2

Period	Causes	Type	KRC			
			BG	MG	NG	TOTAL
	Derailment in-mid-section					
1993-89 to 1997-98	**1-staff failure**	**P**				0
		O				0
		T	0	0	0	0
	2- Permanent Way failure	**P**				0
		O				0
		T	0	0	0	0
	3- Carriage and wagon defects	**P**				0
		O				0
		T	0	0	0	0
	4- Engine defects	**P**				0
		O				0
		T	0	0	0	0
	5- Miscellaneous causes	**P**	6			6
		O				0
		T	6	0	0	6
	6- Total	**P**	6	0	0	6
		O	0	0	0	0
		T	6	0	0	6

Period	Causes	Type	ALL INDIAN RAILWAYS							
			BG		MG		NG		TOTAL	
			A	B	A	B	A	B	A	B
1988-89 to 1992-93	1-staff failure	P	99	41.6	15	23.1	3	25.0	117	37.1
		O	423	55.8	35	41.7	2	50	460	54.4
		T	522	52.4	50	33.6	5	31.3	577	49.7
	2- Permanent Way failure	P	56	23.5	22	33.8	0	0.0	78	24.8
		O	106	14.0	11	13.1	0	0.0	117	13.8
		T	162	16.3	33	22.1	0	0.0	195	16.8
	3- Carriage and wagon defects	P	11	4.6	5	7.7	2	16.7	18	5.7
		O	135	17.8	22	26.2	1	25.0	158	18.7
		T	146	14.7	27	18.1	3	18.8	176	15.2
	4- Engine defects	P	2	0.8	1	1.5	0	0.0	3	1.0
		O	1	0.1	2	2.4	0	0.0	3	0.4
		T	3	0.3	3	2.0	0	0.0	6	0.5
	5- Miscellaneous causes	P	70	29.4	22	33.8	7	58.3	99	31.4
		O	93	12.3	14	16.7	1	25.0	108	12.8
		T	163	16.4	36	24.2	8	50.0	207	17.8
	6- Total	P	238	23.9	65	43.6	12	75.0	315	27.1
		O	758	76.1	84	56.4	4	25.0	846	72.9
		T	996	100	149	100	16	100	1161	100

Period	Causes	Type	SC				SE			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
1993-89 to 1997-98	**1-staff failure**	P	22	7	0	29	65	0	3	68
		O	88	6	0	24	314	0	1	315
		T	110	13	0	123	379	0	4	383
	2- Permanent Way failure	P	5	0	0	5	12	0	0	12
		O	7	1	0	8	40	0	0	40
		T	12	1	0	13	52	0	0	52
	3- Carriage and wagon defects	P	0	0	0	0	1	0	0	1
		O	8	2	0	10	19	0	1	20
		T	8	2	0	10	20	0	1	21
	4- Engine defects	P	0	0	0	0	0	0	0	0
		O	0	0	0	0	0	0	0	0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	14	5	0	19	19	0	4	23
		O	6	3	0	9	45	0	1	46
		T	20	8	0	28	64	0	5	69
	6- Total	P	41	12	0	53	97	0	7	104
		O	109	12	0	121	418	0	3	421
		T	150	24	0	174	515	0	10	525

Period	Causes	Type	WR				METRO			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
1993-89 to 1997-98	**1-staff failure**	P	32	10	0	42	0	0	0	0
		O	74	19	0	93	0	0	0	0
		T	106	29	0	135	0	0	0	0
	2- Permanent Way failure	P	7	1	0	8	2	0	0	2
		O	5	0	0	5	0	0	0	0
		T	12	1	0	13	2	0	0	2
	3- Carriage and wagon defects	P	1	0	0	1	0	0	0	0
		O	6	3	0	9	0	0	0	0
		T	7	3	0	10	0	0	0	0
	4- Engine defects	P	0	0	0	0	0	0	0	0
		O	0	0	0	0	0	0	0	0
		T	0	0	0	0	0	0	0	0
	5- Miscellaneous causes	P	1	0	0	1	0	0	0	0
		O	10	3	0	13	0	0	0	0
		T	11	3	0	14	0	0	0	0
	6- Total	P	41	11	0	52	2	0	0	2
		O	95	25	0	120	0	0	0	0
		T	136	36	0	172	2	0	0	2

Period	Causes	Type	KRC			
			BG	MG	NG	TOTAL
	Derailment in-mid-section					
1993-89 to 1997-98	**1-staff failure**	P	0	0	0	0
		O	0	0	0	0
		T	0	0	0	0
	2- Permanent Way failure	P	0	0	0	0
		O	0	0	0	0
		T	0	0	0	0
	3- Carriage and wagon defects	P	0	0	0	0
		O	0	0	0	0
		T	0	0	0	0
	4- Engine defects	P	0	0	0	0
		O	0	0	0	0
		T	0	0	0	0
	5- Miscellaneous causes	P	6	0	0	6
		O	0	0	0	0
		T	6	0	0	6
	6- Total	P	6	0	0	6
		O	0	0	0	0
		T	6	0	0	6

Period	Causes	Type	ALL INDIAN RAILWAYS							
			BG		MG		NG		TOTAL	
			A	B	A	B	A	B	A	B
1988-89 to 1992-93	**1-staff failure**	P	241	53.4	29	29.9	4	30.8	274	48.8
		O	779	58.1	46	42.6	2	50	827	57.0
		T	1020	57.0	75	36.6	6	35.3	1101	54.7
	2- Permanent Way failure	P	80	17.7	30	30.9	0	0.0	110	19.6
		O	148	11.0	13	12.0	0	0.0	161	11.1
		T	228	12.7	43	21.0	0	0.0	271	13.5
	3- Carriage and wagon defects	P	24	5.3	7	7.2	2	15.4	33	5.9
		O	264	19.7	31	28.7	1	25.0	296	20.4
		T	288	16.1	38	18.5	3	17.6	329	16.3
	4- Engine defects	P	6	1.3	2	2.1	0	0.0	8	1.4
		O	7	0.5	3	2.8	0	0.0	10	0.7
		T	13	0.7	5	2.4	0	0.0	18	0.9
	5- Miscellaneous causes	P	100	22.2	29	29.9	7	53.8	136	24.2
		O	142	10.6	15	13.9	1	25.0	158	10.9
		T	242	13.5	44	21.5	8	47.1	294	14.6
	6- Total	P	451	25.2	97	47.3	13	76.5	561	27.9
		O	1340	74.8	108	52.7	4	23.5	1452	72.1
		T	1791	100	205	100	17	100	2013	100

Annexure – 18

Number and incidence of derailment of passenger and tother trains separately- Railway-wise, Gauge-wise in 5-year blocks.

A = Number of Derailments

B = Incidence per million passenger/ other train kilometers

Period	Railway		Passenger Trains				Other Trains				Grand
			BG	MG	NG	Total	BG	MG	NG	Total	Total
88-89 to 92-93	CR		49	0	7	56	155	0	1	156	212
	ER		59	0	0	59	195	0	0	195	254
	NR		78	18	2	98	176	57	0	233	331
	NE		7	27	0	34	21	45	0	66	100
	NF		18	41	1	60	48	132	0	180	240
	SR		26	32	2	60	91	116	0	207	267
	SC		52	20	0	72	118	43	0	161	233
	SE		78	0	22	100	670	0	12	682	782
	WR		19	25	0	44	78	86	0	164	208
	Metro		0	0	0	0	0	0	0	0	0
	KRC		0	0	0	0	0	0	0	0	0
	Total	A	**386**	**163**	**34**	**583**	**1552**	**479**	**13**	**2044**	**2627**
		B	**0.28**	**0.39**	**0.80**	**0.32**	**1.47**	**2.30**	**1.70**	**1.62**	**0.85**

Period	Railway		Passenger Trains				Other Trains				Grand
			BG	MG	NG	Total	BG	MG	NG	Total	Total
88-89 to 92-93	CR		60	0	0	60	160	0	0	160	220
	ER		57	0	1	058	73	0	0	73	131
	NR		79	13	5	97	262	17	0	279	376
	NE		24	24	0	48	21	13	0	34	82
	NF		23	19	0	42	74	24	1	99	141
	SR		21	18	0	39	128	17	0	145	184
	SC		41	12	0	53	109	12	0	121	174
	SE		97	0	7	104	418	0	3	421	525
	WR		41	11	0	52	95	25	0	120	172
	Metro		2	0	0	2	0	0	0	0	2
	KRC		6	0	0	6	0	0	0	0	6
	Total	**A**	**451**	**97**	**13**	**561**	**1340**	**108**	**4**	**1452**	**2013**
		B	**0.27**	**0.28**	**0.37**	**0.28**	**1.16**	**1.03**	**0.91**	**1.15**	**0.62**

Annexure – 19

Derailments classified according to the types of staff failure Gauge wise Railway wise in -5year blocks

Period	Staff failures classified	Number of Derailments							
		CR				ER			
19 8 8 - 89 to 1992-93	**Operating Staff:**	**BG**	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	9	0	0	9	12	0	0	12
	2-Empty wagon between loaded wagons or mis-marshalling.	0	0	0	0	10	0	0	10
	Commercial Staff:								
	3- Defective loading; viz. uneven loading shifting of loads etc.	5	0	0	5	11	0	0	11
	Drivers:								
	4- Starting or stopping a train with jerk or sudden application of brakes.	3	0	0	3	9	0	0	9
	5-Rough shunting bumping or disregard of shunting signals.	1	0	0	1	7	0	0	7
	6-Disregard of approach or departure signals	13	0	0	13	14	0	0	14
	7-Excessive speed or falling to regulate running trains. Failure to control trains resulting in	18	0	0	18	12	0	0	12

	overshooting.								
	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	44	0	0	44	18	0	0	18
	9-Other engineering staff failures	0	0	0	0	0	0	0	0
	Failure of staff other than mentioned above								
	10- Other staff failures	61	0	4	65	80	0	0	80
	11-Total:	154	0	4	158	173	0	0	173

Period	**Staff failures classified**	**Number of Derailments**							
		NR				**NE**			
19 8 8 - 89 to 1992-93	**Operating Staff:**	BG	MG	NG	Total	BG	MG	NG	Total
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	7	1	0	8	1	1	0	2
	2-Empty wagon between loaded wagons or mis-marshalling.	0	0	0	0	0	0	0	0
	Commercial Staff:								
	3- Defective loading; viz. uneven loading shifting of loads etc.	3	1	0	4	0	2	0	2
	Drivers:								
	4- Starting or stopping a train with jerk or sudden application of brakes.	0	0	0	0	0	1	0	1
	5-Rough shunting bumping or disregard of	0	0	0	0	0	1	0	1

	shunting signals.								
	6-Disregard of approach or departure signals	0	0	0	0	1	3	0	4
	7-Excessive speed or falling to regulate running trains. Failure to control trains resulting in overshooting.	17	8	1	26	2	2	0	4
	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	1	0	0	1	0	3	0	3
	9-Other engineering staff failures	0	0	0	0	0	0	0	0
	Failure of staff other than mentioned above								
	10- Other staff failures	0	0	0	0	0	0	0	0
	11-Total:	28	10	1	39	4	13	0	17

Period	**Staff failures classified**	**Number of Derailments**							
		NF				**SR**			
19 8 8 - 89 to 1992-93	**Operating Staff:**	BG	MG	NG	Total	BG	MG	NG	Total
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	2	1	0	3	3	3	0	6
	2-Empty wagon between loaded wagons or mis-marshalling.	0	1	0	1	0	1	0	1
	Commercial Staff:								
	3- Defective loading; viz. uneven loading shifting of loads etc.	0	12	0	12	2	2	0	4

	Drivers:								
	4- Starting or stopping a train with jerk or sudden application of brakes.	2	6	0	8	1	3	0	4
	5-Rough shunting bumping or disregard of shunting signals.	0	0	0	0	0	0	0	0
	6-Disregard of approach or departure signals	4	7	0	11	1	2	0	3
	7-Excessive speed or falling to regulate running trains. Failure to control trains resulting in overshooting.	0	25	0	25	14	14	0	28
	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	1	1	0	2	2	3	0	5
	9-Other engineering staff failures	6	17	0	23	0	0	0	0
	Failure of staff other than mentioned above								
	10- Other staff failures	23	29	0	52	0	2	0	2
	11-Total:	38	99	0	137	23	30	0	53

Period	Staff failures classified	Number of Derailments							
		SC				SE			
19 8 8 - 89 to 1992-93	**Operating Staff:**	BG	MG	NG	Total	BG	MG	NG	Total
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	3	0	0	3	0	0	0	0
	2-Empty wagon between loaded wagons or mis-	0	0	0	0	0	0	0	0

	marshalling.								
	Commercial Staff:								
	3- Defective loading; viz. uneven loading shifting of loads etc.	2	0	0	2	0	0	0	0
	Drivers:								
	4- Starting or stopping a train with jerk or sudden application of brakes.	1	6	0	7	0	0	0	0
	5-Rough shunting bumping or disregard of shunting signals.	0	0	0	0	0	0	0	0
	6-Disregard of approach or departure signals	8	0	0	8	0	0	0	0
	7-Excessive speed or falling to regulate running trains. Failure to control trains resulting in overshooting.	3	7	0	10	0	0	0	0
	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	0	0	0	0	0	0	0	0
	9-Other engineering staff failures	42	10	0	52	0	0	0	0
	Failure of staff other than mentioned above								
	10- Other staff failures	58	20	0	78	0	0	0	0
	11-Total:	117	43	0	160	0	0	0	0

Period	Staff failures classified	Number of Derailments							
19 8 8 - 89 to 1992-93		WR				METRO			
	Operating Staff:	BG	MG	NG	Total	BG	MG	NG	Total
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	3	3	0	6	0	0	0	0
	2-Empty wagon between loaded wagons or mis-marshalling.	0	0	0	0	0	0	0	0
	Commercial Staff:								
	3- Defective loading; viz. uneven loading shifting of loads etc.	0	3	0	3	0	0	0	0
	Drivers:								
	4- Starting or stopping a train with jerk or sudden application of brakes.	5	7	0	12	0	0	0	0
	5-Rough shunting bumping or disregard of shunting signals.	0	0	0	0	0	0	0	0
	6-Disregard of approach or departure signals	0	0	0	0	0	0	0	0
	7-Excessive speed or falling to regulate running trains. Failure to control trains resulting in overshooting.	8	8	0	16	0	0	0	0
	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	0	0	0	0	0	0	0	0
	9-Other engineering staff failures	0	0	0	0	0	0	0	0

	Failure of staff other than mentioned above								
	10- Other staff failures	60	59	0	119	0	0	0	0
	11-Total:	76	80	0	156	0	0	0	0

Period	**Staff failures classified**	**Number of Derailments**							
		KRC				**TOTAL**			
1988 - 89 to 1992-93	**Operating Staff:**	BG	MG	NG	Total	BG	MG	NG	Total
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	0	0	0	0	40	0	9	49
	2-Empty wagon between loaded wagons or mis-marshalling.	0	0	0	0	10	2	0	12
	Commercial Staff:								
	3- Defective loading; viz. uneven loading shifting of loads etc.	0	0	0	0	23	20	0	43
	Drivers:								
	4- Starting or stopping a train with jerk or sudden application of brakes.	0	0	0	0	21	23	0	44
	5-Rough shunting bumping or disregard of shunting signals.	0	0	0	0	8	1	0	9
	6-Disregard of approach or departure signals	0	0	0	0	41	12	0	53
	7-Excessive speed or falling to regulate running trains. Failure to control trains resulting in	0	0	0	0	74	64	1	139

	overshooting.								
	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	0	0	0	0	66	7	0	73
	9-Other engineering staff failures	0	0	0	0	48	27	0	75
	Failure of staff other than mentioned above								
	10- Other staff failures	0	0	0	0	282	110	4	396
	11-Total:	0	0	0	0	613	275	5	893

Cont'd…

Annexure-19(Cont'd)

Derailments classified according to the types of staff failure Gauge wise Railway wise in -5year blocks

Period	Staff failures classified	Number of Derailments							
19 93 - 94 to 1997-98		CR				ER			
	Operating Staff:	**BG**	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	6	0	0	6	8	0	0	8
	2-Empty wagon between loaded wagons or mis-marshalling.	1	0	0	1	6	0	0	6
	Commercial Staff:								
	3- Defective loading; viz. uneven loading shifting of loads etc.	4	0	0	4	9	0	0	9
	Drivers:								
	4- Starting or stopping a train with jerk or sudden application of brakes.	4	0	0	4	6	0	0	6
	5-Rough shunting bumping or disregard of shunting signals.	1	0	0	1	6	0	0	6
	6-Disregard of approach or departure signals	2	0	0	2	8	0	0	8
	7-Excessive speed or falling to regulate running trains. Failure to control trains resulting in overshooting.	16	0	0	16	8	0	0	8

	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	38	0	0	38	8	0	0	8
	9-Other engineering staff failures	0	0	0	0	0	0	0	0
	Failure of staff other than mentioned above								
	10- Other staff failures	97	0	0	97	40	0	0	40
	11-Total:	169	0	0	169	98	0	0	98

Period	**Staff failures classified**	**Number of Derailments**							
19 93 - 94 to 1997-98		**NR**				**NE**			
	Operating Staff:	**BG**	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	16	0	0	16	1	0	0	1
	2-Empty wagon between loaded wagons or mis-marshalling.	0	0	0	0	0	0	0	0
	Commercial Staff:								
	3- Defective loading; viz. uneven loading shifting of loads etc.	6	0	0	6	0	0	0	0
	Drivers:								
	4- Starting or stopping a train with jerk or sudden application of brakes.	0	0	0	0	0	0	0	0

	5-Rough shunting bumping or disregard of shunting signals.	0	0	0	0	0	0	0	0
	6-Disregard of approach or departure signals	0	0	0	0	0	0	0	0
	7-Excessive speed or falling to regulate running trains. Failure to control trains resulting in overshooting.	29	0	1	30	3	2	0	5
	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	1	0	0	1	1	2	0	3
	9-Other engineering staff failures	0	0	0	0	0	0	0	0
	Failure of staff other than mentioned above								
	10- Other staff failures	0	0	0	0	0	0	0	0
	11-Total:	52	0	1	53	5	4	0	9

Period	**Staff failures classified**	**Number of Derailments**							
		NF				**SR**			
1993 - 94 to 1997-98	**Operating Staff:**	**BG**	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	5	1	0	6	4	1	0	5
	2-Empty wagon between loaded wagons or mis-marshalling.	2	1	0	3	1	0	0	1
	Commercial Staff:								
	3- Defective loading; viz. uneven	1	1	0	2	3	0	0	3

	loading shifting of loads etc.								
	Drivers:								
	4- Starting or stopping a train with jerk or sudden application of brakes.	0	0	0	0	1	0	0	1
	5-Rough shunting bumping or disregard of shunting signals.	2	0	0	2	0	0	0	0
	6-Disregard of approach or departure signals	4	0	0	4	5	1	0	6
	7-Excessive speed or falling to regulate running trains. Failure to control trains resulting in overshooting.	14	0	1	23	6	0	0	6
	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	2	2	0	4	7	0	0	7
	9-Other engineering staff failures	0	0	0	0	0	0	0	0
	Failure of staff other than mentioned above								
	10- Other staff failures	44	11	0	55	0	1	0	1
	11-Total:	74	26	1	101	27	3	0	30

Period	Staff failures classified	Number of Derailments							
19 93 - 94 to 1997-98		SC				SE			
	Operating Staff:	**BG**	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	6	1	0	7	8	0	1	9
	2-Empty wagon between loaded wagons or mis-marshalling.	0	0	0	0	0	0	0	0
	Commercial Staff:								
	3- Defective loading; viz. uneven loading shifting of loads etc.	0	0	0	0	5	0	0	5
	Drivers:								
	4- Starting or stopping a train with jerk or sudden application of brakes.	3	0	0	3	9	0	0	9
	5-Rough shunting bumping or disregard of shunting signals.	0	0	0	0	0	0	0	0
	6-Disregard of approach or departure signals	4	2	0	6	9	0	0	9
	7-Excessive speed or falling to regulate running trains. Failure to control trains resulting in overshooting.	10	2	0	12	29	0	0	29
	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	0	0	0	0	115	0	1	116

	9-Other engineering staff failures	24	0	0	24	0	0	0	0
	Failure of staff other than mentioned above								
	10- Other staff failures	63	8	0	71	204	0	2	206
	11-Total:	110	13	0	123	379	0	4	383

Period	**Staff failures classified**	**Number of Derailments**							
19 93 - 94 to 1997-98		**WR**				**METRO**			
	Operating Staff:	**BG**	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	3	1	0	4	0	0	0	0
	2-Empty wagon between loaded wagons or mis-marshalling.	0	0	0	0	0	0	0	0
	Commercial Staff:								
	3- Defective loading; viz. uneven loading shifting of loads etc.	0	0	0	0	0	0	0	0
	Drivers:								
	4- Starting or stopping a train with jerk or sudden application of brakes.	4	3	0	7	0	0	0	0
	5-Rough shunting bumping or disregard of shunting signals.	0	0	0	0	0	0	0	0
	6-Disregard of approach or departure signals	0	0	0	0	0	0	0	0
	7-Excessive speed or falling to regulate running	7	1	0	8	0	0	0	0

	trains. Failure to control trains resulting in overshooting.								
	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	0	0	0	0	0	0	0	0
	9-Other engineering staff failures	0	0	0	0	0	0	0	0
	Failure of staff other than mentioned above								
	10- Other staff failures	92	24	0	116	0	0	0	0
	11-Total:	106	29	0	135	0	0	0	0

Period	**Staff failures classified**	**Number of Derailments**							
		KRC				**TOTAL**			
19 93 - 94 to 1997-98	**Operating Staff:**	**BG**	**MG**	**NG**	**Total**	**BG**	**MG**	**NG**	**Total**
	1-Incorrect setting of non- interlocking or mis - manipulation of Points; Incorrect setting of trap points or bursting of points.	0	0	0	0	57	4	1	62
	2-Empty wagon between loaded wagons or mis-marshalling.	0	0	0	0	10	1	0	11
	Commercial Staff:								
	3- Defective loading; viz. uneven loading shifting of loads etc.	0	0	0	0	28	1	0	29
	Drivers:								

	4- Starting or stopping a train with jerk or sudden application of brakes.	0	0	0	0	27	3	0	30
	5-Rough shunting bumping or disregard of shunting signals.	0	0	0	0	9	0	0	9
	6-Disregard of approach or departure signals	0	0	0	0	32	3	0	35
	7-Excessive speed or falling to regulate running trains. Failure to control trains resulting in overshooting.	0	0	0	0	121	15	2	138
	Engineering Staff								
	8-Non-protection of engineering works, failure to issue caution orders, for engineering works or inadequate protection at site.	0	0	0	0	172	4	1	177
	9-Other engineering staff failures	0	0	0	0	24	0	0	24
	Failure of staff other than mentioned above								
	10- Other staff failures	0	0	0	0	540	44	2	586
	11-Total:	0	0	0	0	1020	75	6	1101

Annexure – 21

Derailments of coaching vehicles and Goods wagons on the Broad, Metre! & Narrow Gauge due to carriage and wagon defects _ Railway wise; in five-year blocks

Railway	Number of derailments during 88-89 to 92-93											
	Coaching vehicles				Goods wagons				Coaching and goods vehicles combined			
	BG	MG	NG	TOTAL	BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
CR	1	0	0	1	21	0	0	21	22	0	0	22
ER	4	0	0	4	20	0	0	20	24	0	0	24
NR	16	11	1	28	99	26	0	125	115	37	1	153
NE	0	9	0	9	12	27	0	39	12	36	0	48
NF	0	3	0	3	5	36	0	41	5	39	0	44
SR	2	2	0	4	29	34	0	63	31	36	0	67
SC	3	1	0	4	18	6	0	24	21	7	0	28
SE	0	0	0	0	0	0	0	0	0	0	0	0
WR	0	1	0	1	5	16	0	21	5	17	0	22
METRO	0	0	0	0	0	0	0	0	0	0	0	0
KRC	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**26**	**27**	**1**	**54**	**209**	**145**	**0**	**354**	**235**	**172**	**1**	**408**

Railway	Number of derailments during 93-94 to 97-98											
	Coaching vehicles				Goods wagons				Coaching and goods vehicles combined			
	BG	MG	NG	TOTAL	BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
CR	2	0	0	2	19	0	0	19	21	0	0	21
ER	0	0	1	1	2	0	0	2	2	0	1	3
NR	13	2	1	16	133	11	0	144	146	13	1	160
NE	3	3	0	6	11	8	0	19	14	11	0	25
NF	1	0	0	1	9	2	0	11	10	2	0	12
SR	2	2	0	4	58	5	0	63	60	7	0	67
SC	0	0	0	0	8	2	0	10	8	2	0	10
SE	2	0	0	2	18	0	1	19	20	0	1	21
WR	1	0	0	1	6	3	0	9	7	3	0	10
METRO	0	0	0	0	0	0	0	0	0	0	0	0
KRC	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**24**	**7**	**2**	**33**	**264**	**31**	**1**	**296**	**288**	**38**	**3**	**329**

Annexure-20

Derailments at stations and in mid-section classified according to the nature of Permanent way failures on All Indian Railways-Gauge -wise in 5-year blocks

A – Number of Derailments **B – Number of derailments due to cause taken as a percentage to the total**

S. No.	Nature of Permanent way failure		1988-89 to 1992-93											
			At station				In mid-section				Total			
			BG	MG	NG	TOTAL	BG	MG	NG	TOTAL	BG	MG	NG	TOTAL
1	Incorrect gauge	A	15	3	0	18	20	4	0	24	35	7	0	42
		B	26.32	30.00		26.87	20.83	9.09		17.14	22.88	12.96		20.29
2	Defective Cross or Longitudinal levels	A	3	1	0	4	10	2	0	12	13	3	0	16
		B	5.26	10.00		5.97	10.42	4.55		8.57	8.50	5.56		7.73
3	Sinkage of Track	A	2	0	0	2	2	2	0	4	4	2	0	6
		B	3.51	0		2.99	2.08	4.55		2.86	2.61	3.70		2.90
	Badly aligned	A	0	0	0	0	2	1	0	3	2	1	0	3
4							2.08	2.27		2.14	1.31	1.85		1.45

	curve or incorrect													
	Super elevation or kinks in track	B												
5	Defective Track Materials	A	6	0	0	6	3	3	0	6	9	3	0	12
		B	10.53			8.96	3.13	6.82		4.29	5.88	5.56		5.80
6	Defective points, Crossings or Turnouts	A	1	1	0	2	0	0	0	0	1	1	0	2
		B	1.75	10.00		2.99					0.65	1.85		0.97
7	Combined effect of defects in Track and rolling stock or engine or higher speed but defect in track being the predominant cause,	A	13	2	0	15	19	18		37	32	20		52
		B	22.81	20		22.39	19.79	40.91		26.43	20.92	37.04		25.12

	other factors being secondary.													
8	**Other Track Defects:**													
i	Rail Fractures	A	15	1	0	16	30	8	0	38	45	9	0	54
		B	26.32	10.00		23.88	31.25	18.18		27.14	29.41	16.67		26.09
ii	Buckling of track	A	0	0	0	0	2	1	0	3	2	1	0	3
		B	0.00				2.08	2.27		2.14	1.31	1.85		1.45
iii	Slack or loose packing	A	2	0	0	2	5	8	0	8	7	3	0	10
		B	3.51			2.99	5.21	18.18		5.71	4.58	5.56		4.83
iv	Weld failures	A	0	2	0	2	3	2	0	5	3	4	0	7
		B	0.00	20.00		2.99	3.13	4.55		3.57	1.96	7.41		3.38
v	Total:	A	17	3	0	20	40	14	0	54	57	17	0	74
		B	29.82	30.00		29.85	41.67	31.82		38.57	37.25	31.48		35.75
9	Grand Total:	A	57	10	0	67	96	44	0	140	153	54	0	207
		B	100.0	100.0		100.0	100.0	100.0		100.0	100.0	100.0		100.0

S.No.	Nature of Permanent way failure		1993-94to 1997-98											
			At station				In mid-section				Total			
1	Incorrect gauge	A	22	2	0	24	36	4	0	40	58	6	0	64
		B	31.88	18.18		30.00	22.64	12.50		20.94	25.44	13.95		23.62
2	Defective Cross or Longitudinal	A	7	0	0	7	15	3	0	18	22	3	0	25
	levels	B	10.14	0.00		8.75	9.43	9.38		9.42	9.65	9.68		9.23
3	Sinkage of Track	A	0	1	0	1	3	0	0	3	3	1	0	4
		B	0.00	9.09		1.25	1.89	0		1.57	1.32	2.33		1.48
	Badly	A	0	0	0	0	4	4	0	8	4	4	0	8
4	aligned curve or incorrect													
	Super elevation or kinks in track	B					2.52	12.5		4.19	1.75	9.30		2.95
5	Defective Track Materials	A	3	0	0	3	3	1	0	4	6	1	0	7
		B	4.35			3.75	1.89	3.13		2.09	2.63	2.33		3.69

6	Defective points, Crossings or Turnouts	A	8	0	0	8	1	1	0	2	9	1	0	10
		B	11.59	0.00		10.00					3.95	2.33		3.69
7	Combined effect of defects in Track and rolling stock or engine or higher speed but defect in track being the predominant cause, other factors being secondary.	A	16	3	0	19	19	8	0	27	35	11	0	46
		B	23.19	27.27		23.75	11.95	25		14.14	15.35	25.58		16.97
8	**Other Track Defects:**													
i	Rail Fractures	A	12	5	0	17	55	7	0	62	67	12	0	79
		B	17.39	45.45		21.25	34.59	21.88		32.46	29.39	27.91		29.15
ii	Buckling of track	A	0	0	0	0	4	2	0	6	4	2	0	6
		B	0.00				2.52	6.25		3.14	1.75	4.65		2.21
iii	Slack or loose packing	A	1	0	0	1	6	1	0	7	7	1	0	8
		B	1.45			1.25	3.77	3.125		3.66	3.07	2.33		2.95

iv	Weld failures	A	0	0	0	0	13	1	0	14	13	1	0	14
		B	0.00	0.00		0.00	8.18	3.13		7.33	5.70	2.33		5.17
v	Total:	A	13	5	0	18	78	11	0	89	91	16	0	107
		B	18.84	45.45		22.50	49.06	34.38		46.60	39.91	37.21		39.48
9	Grand Total:	A	69	11	0	80	159	32	0	191	228	43	0	271
		B	100.0	100.0		100.0	100.0	100.0		100.0	100.0	100.0		100.0

Annexure -22 (Contd.)

DERAILMENTS ACCORDING TO THE TYPE OF CARRIAGE AND WAGON DEFECTS RAILWAY-WISE, GAUGE-WISE IN 5-YEAR BLOCKS

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	CR	ER	NR	NE	NF	SR
1993-94 to 1997-98	1- Defective and broken springs or suspensions.	BG	4	0	10	3	0	16
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	4	0	10	3	0	16
	2- Breakage of undergear and vacuum or brake fittings.	BG	1	0	9	1	2	1
		MG	0	0	1	3	2	1
		NG	0	0	0	0	0	0
		TOTAL	1	0	10	4	4	2
	3- Defective or inadequate or	BG	0	0	0	0	0	0

	excessive play in brasses.	MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	4-Defective or broken axle boxes	BG	2	0	4	0	1	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	0	4	0	1	0
	5-Binding brake blocks or defective brakes or brake power.	BG	1	1	7	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	1	7	0	0	0
	6-Defective wheel or tyre	BG	3	0	15	2	2	5
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	3	0	15	0	0	5
	7-**Broken axle or spring**							
	a-Hot axle	BG	2	0	12	0	0	8
		MG	0	0	0	1	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	0	12	1	0	8
	b- Cold axle	BG	2	0	14	0	0	6
		MG	0	0	5	1	0	0

		NG	0	0	0	0	0	0
		TOTAL	2	0	19	1	0	6
	8-Seized roller bearings.	BG	0	0	4	0	0	4
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	4	0	0	4
	9-Coupling failure.	BG	2	0	1	1	1	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	2	0	1	2	1	0
	10-Defective buffers.	BG	0	0	2	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	2	0	0	0
	11-Defective bogie holster hangers.	BG	1	0	3	0	0	3
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	0	3	0	0	3
	12-Combined effect of rolling stock and track defects or excessive speed but primary cause being defect in carriage	BG	1	0	50	0	1	12
		MG	0	0	4	0	0	4
		NG	0	0	1	0	0	0
		TOTAL	1	0	55	0	1	16

	and wagon.							
	13-Other defects.	BG	2	1	15	7	3	5
		MG	0	0	3	4	0	2
		NG	0	1	0	0	0	0
		TOTAL	2	2	18	11	3	7
	14-Total:	BG	21	2	146	14	10	60
		MG	0	0	13	11	2	7
		NG	0	1	1	0	0	0
		TOTAL	21	3	160	25	12	67

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	CR	ER	NR	NE	NF	SR
1993-94 to 1997-98	1- Defective and broken springs or suspensions.	BG	1	4	2	0	0	40
		MG	1	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	2	4	2	0	0	41
	2- Breakage of undergear and vacuum or brake fittings.	BG	0	4	0	0	0	18
		MG	0	0	1	0	0	8
		NG	0	0	0	0	0	0
		TOTAL	0	4	1	0	0	26
	3- Defective or inadequate or excessive play in brasses.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0

		TOTAL	0	0	0	0	0	0
	4-Defective or broken axle boxes	BG	1	1	0	0	0	9
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	1	0	0	0	9
	5-Binding brake blocks or defective brakes or brake power.	BG	1	0	0	0	0	10
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	0	0	0	0	10
	6-Defective wheel or tyre	BG	1	2	0	0	0	30
		MG	0	0	0	0	0	1
		NG	0	1	0	0	0	1
		TOTAL	1	3	0	0	0	32
	7-**Broken axle or spring**							
	a-Hot axle	BG	3	1	5	0	0	31
		MG	0	0	2	0	0	3
		NG	0	0	0	0	0	0
		TOTAL	3	1	7	0	0	34
	b- Cold axle	BG	0	3	0	0	0	25
		MG	0	0	0	0	0	6
		NG	0	0	0	0	0	0
		TOTAL	0	3	0	0	0	31

	8-Seized roller bearings.	BG	1	0	0	0	0	9
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	1	0	0	0	0	9
	9-Coupling failure.	BG	0	0	0	0	0	5
		MG	0	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	6
	10-Defective buffers.	BG	0	2	0	0	0	4
		MG	1	0	0	0	0	1
		NG	0	0	0	0	0	0
		TOTAL	1	2	0	0	0	5
	11-Defective bogie holster hangers.	BG	0	0	0	0	0	7
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	7
	12-Combined effect of rolling stock and track defects or excessive speed but primary cause being defect in carriage and wagon.	BG	0	1	0	0	0	65
		MG	0	0	0	0	0	8
		NG	0	0	0	0	0	1
		TOTAL	0	1	0	0	0	74
	13-Other defects.	BG	0	2	0	0	0	35

		MG	0	0	0	0	0	9
		NG	0	0	0	0	0	1
		TOTAL	0	2	0	0	0	45
	14-Total:	BG	8	20	7	0	0	288
		MG	2	0	3	0	0	38
		NG	0	1	0	0	0	3
		TOTAL	10	21	10	0	0	329

Annexure 23 (Contd.)

Derailments of Passenger and Other trains according to the type of carriage & wagon defects- Railway-wise, Gauge-wise in 5-year blocks

P- Passenger Trains **O- Other trains** **T- Total**

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	CR			ER			NR		
			P	T	O	P	T	O	P	T	O
1993-94 to 1997-98	1- Defective and broken springs or suspensions.	BG	0	4	4	0	0	0	1	9	10
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	4	4	0	0	0	1	9	10
	2- Breakage of undergear and vacuum or brake fittings.	BG	1	0	1	0	0	0	0	9	9
		MG	0	0	0	0	0	0	0	1	1
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	0	1	0	0	0	0	10	10
	3- Defective or inadequate or excessive play in brasses.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0

	4-Defective or broken axle boxes	BG	0	2	2	0	0	0	0	4	4
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	2	2	0	0	0	0	4	4
	5-Binding brake blocks or defective brakes or brake power.	BG	0	1	1	0	1	1	0	7	7
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	1	1	0	0	7
	6-Defective wheel or tyre	BG	1	2	3	0	0	0	4	11	15
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	2	3	0	0	0	4	11	15
	7-**Broken axle or spring**										
	a-Hot axle	BG	0	2	2	0	0	0	0	12	12
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	2	2	0	0	0	0	12	12
	b- Cold axle	BG	0	2	2	0	0	0	1	13	14
		MG	0	0	0	0	0	0	0	5	5
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	2	2	0	0	0	1	18	19
	8-Seized roller bearings.	BG	0	0	0	0	0	0	0	4	4

		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	4	4
	9-Coupling failure.	BG	0	2	2	0	0	0	0	1	1
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	2	2	0	0	0	0	1	1
	10-Defective buffers.	BG	0	0	0	0	0	0	1	1	2
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	1	1	2
	11-Defective bogie holster hangers.	BG	0	1	1	0	0	0	0	3	3
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	0	0	0	3	3
	12-Combined effect of rolling stock and track defects or excessive speed but primary cause being defect in carriage and wagon.	BG	0	1	1	0	0	0	2	48	50
		MG	0	0	0	0	0	0	1	3	4
		NG	0	0	0	0	0	0	1	0	1
		TOTAL	0	1	1	0	0	0	4	51	55
	13-Other defects.	BG	0	2	2	0	1	1	4	11	15

		MG	0	0	0	0	0	0	1	2	3
		NG	0	0	0	1	0	1	0	0	0
		TOTAL	0	2	2	1	1	2	5	13	18
	14-Total:	BG	2	19	21	0	2	2	13	133	146
		MG	0	0	0	0	0	0	2	11	13
		NG	0	0	0	1	0	1	1	0	1
		TOTAL	2	19	21	1	2	3	16	144	160

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	NE			NF			SR		
			P	O	T	P	O	T	P	O	T
1993-94 to 1997-98	1- Defective and broken springs or suspensions.	BG	0	3	3	0	0	0	1	15	16
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	3	3	0	0	0	1	15	16
	2- Breakage of undergear and vacuum or brake fittings.	BG	0	1	1	0	2	2	0	1	1
		MG	1	2	3	0	2	2	0	1	1
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	3	4	0	4	4	0	2	2
	3- Defective or inadequate or excessive play in brasses.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0

		TOTAL	0	0	0	0	0	0	0	0	0
	4-Defective or broken axle boxes	BG	0	0	0	0	1	1	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0
	5-Binding brake blocks or defective brakes or brake power.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0
	6-Defective wheel or tyre	BG	0	2	2	0	2	2	1	4	5
		MG	0	1	1	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	3	3	0	2	2	1	4	5
	7-**Broken axle or spring**										
	a-Hot axle	BG	0	0	0	0	0	0	0	8	8
		MG	1	0	1	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	0	1	0	0	0	0	8	8
	b- Cold axle	BG	0	0	0	0	0	0	0	6	6
		MG	0	1	1	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	0	0	0	6	6
	8-Seized roller bearings.	BG	0	0	0	0	0	0	0	4	4
		MG	0	0	0	0	0	0	0	0	0

		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	4	4
	9-Coupling failure.	BG	0	1	1	0	1	1	0	0	0
		MG	0	1	1	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	2	2	0	1	1	0	0	0
	10-Defective buffers.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0
	11-Defective bogie holster hangers.	BG	0	0	0	0	0	0	0	3	3
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	3	3
	12-Combined effect of rolling stock and track defects or excessive speed but primary cause being defect in carriage and wagon.	BG	0	0	0	1	0	1	0	12	12
		MG	0	0	0	0	0	0	2	2	4
		NG		0	0	0	0	0	0	0	0
		TOTAL	0	0	0	1	0	1	2	14	16
	13-Other defects.	BG	3	4	7	0	3	3	0	5	5
		MG	1	3	4	0	0	0	0	2	2
		NG	0	0	0	0	0	0	0	0	0

		TOTAL	4	7	11	0	3	3	0	7	7
	14-Total:	BG	3	11	14	1	9	10	2	58	60
		MG	3	8	11	0	2	2	2	5	7
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	6	19	25	1	11	12	4	63	67

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	SC			SE			WR		
			P	O	T	P	O	T	P	O	T
1993-94 to 1997-98	1- Defective and broken springs or suspensions.	BG	0	1	1	0	4	4	1	1	2
		MG	0	1	1	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	2	2	0	4	4	1	1	2
	2- Breakage of undergear and vacuum or brake fittings.	BG	0	0	0	1	3	4	0	0	0
		MG	0	0	0	0	0	0	0	1	1
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	1	3	4	0	1	1
	3- Defective or inadequate or excessive play in brasses.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0
	4-Defective or broken	BG	0	1	1	0	1	1	0	0	0

	axle boxes	MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	1	1	0	0	0
	5-Binding brake blocks or defective brakes or brake power.	BG	0	1	1	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	0	0	0	0	0
	6-Defective wheel or tyre	BG	0	1	1	0	2	2	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	1	1	0	0	0
		TOTAL	0	1	1	0	3	3	0	0	0
	7-**Broken axle or spring**										
	a-Hot axle	BG	0	3	3	0	1	1	0	5	5
		MG	0	0	0	0	0	0	0	2	2
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	3	3	0	1	1	0	7	7
	b- Cold axle	BG	0	0	0	0	3	3	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	3	3	0	0	0
	8-Seized roller bearings.	BG	0	1	1	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0

		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	0	0	0	0	0
	9-Coupling failure.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0
	10-Defective buffers.	BG	0	0	0	1	1	2	0	0	0
		MG	0	1	1	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	1	1	2	0	0	0
	11-Defective bogie holster hangers.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0
	12-Combined effect of rolling stock and track defects or excessive speed but primary cause being defect in carriage and wagon.	BG	0	0	0	0	1	1	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	1	1	0	0	0
	13-Other defects.	BG	0	0	0	0	2	2	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0

		TOTAL	0	0	0	0	2	2	0	0	0
	14-Total:	BG	0	8	8	2	18	29	1	6	7
		MG	0	2	2	0	0	0	0	3	3
		NG	0	0	0	0	1	1	0	0	0
		TOTAL	0	10	10	2	19	21	1	9	10

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	METRO			KRC		
			P	O	T	P	O	T
1993-94 to 1997-98	1- Defective and broken springs or suspensions.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	2- Breakage of undergear and vacuum or brake fittings.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	3- Defective or inadequate or excessive play in brasses.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	4-Defective or broken axle boxes	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0

		TOTAL	0	0	0	0	0	0
	5-Binding brake blocks or defective brakes or brake power.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	6-Defective wheel or tyre	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	7-**Broken axle or spring**							
	a-Hot axle	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	b- Cold axle	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	8-Seized roller bearings.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	9-Coupling failure.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0

	10-Defective buffers.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	11-Defective bogie holster hangers.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	12-Combined effect of rolling stock and track defects or excessive speed but primary cause being defect in carriage and wagon.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	13-Other defects.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	14-Total:	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0

Annexure – 23

Derailments of Passenger and Other trains according to the type of carriage & wagon defects- Railway-wise, Gauge-wise in 5-year blocks

P- Passenger Trains **O- Other trains** **T- Total**

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	CR			ER			NR		
			P	O	T	P	O	T	P	O	T
1988-89to 1992-93	1- Defective and broken springs or suspensions.	BG	0	4	4	0	4	4	1	4	5
		MG	0	0	0	0	0	0	0	4	4
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	4	4	0	4	4	1	8	9
	2- Breakage of undergear and vacuum or brake fittings.	BG	0	2	2	0	4	4	0	11	11
		MG	0	0	0	0	0	0	1	3	4
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	2	2	0	4	4	1	14	15
	3- Defective or inadequate or excessive play in brasses.	BG	0	0	0	0	0	0	0	1	1
		MG	0	0	0	0	0	0	0	1	1
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	2	2
	4-Defective or broken axle boxes	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	1	1

		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	1	1
	5-Binding brake blocks or defective brakes or brake power.	BG	0	1	1	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	0	0	0	0	0
	6-Defective wheel or tyre	BG	0	3	3	0	0	0	2	9	11
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	3	3	0	0	0	2	9	11
	7-**Broken axle or spring**										
	a-Hot axle	BG	0	3	3	0	2	2	2	26	28
		MG	0	0	0	0	0	0	0	1	1
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	3	3	0	2	2	2	27	29
	b- Cold axle	BG	0	5	5	1	6	7	0	15	15
		MG	0	0	0	0	0	0	0	6	6
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	5	5	1	6	7	0	21	21
	8-Seized roller bearings.	BG	0	2	2	0	1	1	0	5	5
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0

		TOTAL	0	2	2	0	1	1	0	5	5
	9-Coupling failure.	BG	0	0	0	0	1	1	0	0	0
		MG	0	0	0	0	0	0	0	1	1
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	1	1	0	1	1
	10-Defective buffers.	BG	0	0	0	0	0	0	0	1	1
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	1	1
	11-Defective bogie holster hangers.	BG	1	0	1	0	0	0	1	3	4
		MG	0	0	0	0	0	0	0	1	1
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	0	1	0	0	0	1	4	5
	12-Combined effect of rolling stock and track defects or excessive speed but primary cause being defect in carriage and wagon.	BG	0	0	0	2	2	4	7	19	26
		MG	0	0	0	0	0	0	9	2	11
		NG	0	0	0	0	0	0	1	0	1
		TOTAL	0	0	0	2	2	4	17	21	38
	13-Other defects.	BG	0	1	1	1	0	1	3	5	8
		MG	0	0	0	0	0	0	1	6	7
		NG	0	0	0	0	0	0	0	0	0

		TOTAL	0	1	1	1	0	1	4	11	15
	14-Total:	BG	1	21	22	4	20	24	16	99	115
		MG	0	0	0	0	0	0	11	26	37
		NG	0	0	0	0	0	0	1	0	1
		TOTAL	1	21	22	4	20	24	28	125	153

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	NE			NF			SR		
			P	O	T	P	O	T	P	O	T
1988-89to 1992-93	1- Defective and broken springs or suspensions.	BG	0	2	2	0	0	0	0	9	9
		MG	2	7	9	1	1	2	0	10	10
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	2	9	11	1	1	2	0	19	19
	2- Breakage of undergear and vacuum or brake fittings.	BG	0	1	1	0	0	0	1	2	3
		MG	1	3	4	1	10	11	0	5	5
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	4	5	1	10	11	1	7	8
	3- Defective or inadequate or excessive play in brasses.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0
	4-Defective or broken axle boxes	BG	0	0	0	0	2	2	0	1	1
		MG	0	1	1	0	13	13	0	0	0

		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	15	15	0	1	1
	5-Binding brake blocks or defective brakes or brake power.	BG	0	1	1	0	0	0	0	0	0
		MG	1	1	2	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	2	3	0	0	0	0	0	0
	6-Defective wheel or tyre	BG	0	1	1	0	0	0	0	2	2
		MG	1	0	1	0	0	0	2	3	5
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	1	2	0	0	0	2	5	7
	7-**Broken axle or spring**										
	a-Hot axle	BG	1	4	4	0	0	0	0	3	3
		MG	1	8	9	0	1	1	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	12	13	0	1	1	0	3	3
	b- Cold axle	BG	0	1	1	0	0	0	1	0	1
		MG	1	1	2	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	2	3	0	0	0	1	0	1
	8-Seized roller bearings.	BG	0	1	1	0	1	1	0	1	1
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0

		TOTAL	0	1	1	0	1	1	0	1	1
	9-Coupling failure.	BG	0	0	0	0	0	0	0	0	0
		MG	0	1	1	0	1	1	0	3	3
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	1	1	0	3	3
	10-Defective buffers.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0
	11-Defective bogie holster hangers.	BG	0	0	0	0	0	0	0	0	0
		MG	0	1	1	0	1	1	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	1	1	0	0	0
	12-Combined effect of rolling stock and track defects or excessive speed but primary cause being defect in carriage and wagon.	BG	0	0	0	0	0	0	0	7	7
		MG	0	1	1	0	0	0	0	10	10
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	0	0	0	17	17
	13-Other defects.	BG	0	1	1	0	2	2	0	4	4
		MG	1	3	4	1	9	10	0	3	3
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	4	5	1	11	12	0	7	7

	14-Total:	BG	0	12	12	0	5	5	2	29	31
		MG	8	27	35	3	36	39	2	34	36
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	8	39	47	3	41	44	4	63	67

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	SC			SE			WR		
			P	O	T	P	O	T	P	O	T
1988-89to 1992-93	1- Defective and broken springs or suspensions.	BG	1	3	4	0	0	0	0	2	2
		MG	0	2	2	0	0	0	0	2	2
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	5	6	0	0	0	0	4	4
	2- Breakage of undergear and vacuum or brake fittings.	BG	1	0	1	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	5	5
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	0	1	0	0	0	0	5	5
	3- Defective or inadequate or excessive play in brasses.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	1	1
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	1	1
	4-Defective or broken axle boxes	BG	1	0	1	0	0	0	0	0	0
		MG	0	1	1	0	0	0	0	0	0

		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	1	2	0	0	0	0	0	0
	5-Binding brake blocks or defective brakes or brake power.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0
	6-Defective wheel or tyre	BG	0	2	2	0	0	0	0	0	0
		MG	0	2	2	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	4	4	0	0	0	0	0	0
	7-**Broken axle or spring**										
	a-Hot axle	BG	0	3	3	0	0	0	0	3	3
		MG	0	0	0	0	0	0	1	7	8
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	3	3	0	0	0	1	10	11
	b- Cold axle	BG	0	4	4	0	0	0	0	0	0
		MG	1	1	2	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	1	5	6	0	0	0	0	0	0
	8-Seized roller bearings.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0

	9-Coupling failure.	BG	0	1	1	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	1	1	0	0	0	0	0	0
	10-Defective buffers.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0
	11-Defective bogie holster hangers.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0
	12-Combined effect of rolling stock and track defects or excessive speed but primary cause being defect in carriage and wagon.	BG	0	5	5	0	0	0	0	0	0
		MG	0	1	1	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	6	6	0	0	0	0	0	0
	13-Other defects.	BG	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	1	1
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	1	1
	14-Total:	BG	3	18	21	0	0	0	0	5	5

		MG	1	7	8	0	0	0	1	16	17
		NG	0	0	0	0	0	0	0	0	0
		TOTAL	4	25	29	0	0	0	1	21	22

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	METRO			KRC		
			P	O	T	P	O	T
1988-89to 1992-93	1- Defective and broken springs or suspensions.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	2- Breakage of undergear and vacuum or brake fittings.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	3- Defective or inadequate or excessive play in brasses.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	4-Defective or broken axle boxes	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	5-Binding brake blocks	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0

	or defective brakes or brake power.	NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	6-Defective wheel or tyre	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	7-**Broken axle or spring**							
	a-Hot axle	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	b- Cold axle	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	8-Seized roller bearings.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	9-Coupling failure.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	10-Defective buffers.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0

		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	11-Defective bogie holster hangers.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	12-Combined effect of rolling stock and track defects or excessive speed but primary cause being defect in carriage and wagon.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	13-Other defects.	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0
	14-Total:	BG	0	0	0	0	0	0
		MG	0	0	0	0	0	0
		NG	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0

Annexure -24

Number and incidence of derailments on all gauges due to engine defects- Railway-wise Gauge-wise in 5-Year block.

A = Number of Derailments **B = Incidence of Derailments Per million train kilometres**

1988-89 to 1992-93	Railway		Number of derailments			Total Number of derailments
			BG	MG	NG	
	CR		1	0	0	1
	ER		2	0	0	2
	NR		3	2	0	5
	NE		0	7	0	7
	NF		0	0	0	0
	SR		0	1	0	1
	SC		0	0	0	0
	SE		0	0	0	0
	WR		0	1	0	1
	METRO		0	0	0	0
	KRC		0	0	0	0
	TOTAL	A	6	11	0	17

		B	0.002	0.18	0	0.005

93-94to 97-98	Railway		Number of derailments			Total Number of derailments
			BG	MG	NG	
		CR	0	0	0	0
		ER	1	0	0	1
		NR	6	1	0	7
		NE	3	3	0	6
		NF	0	0	0	0
		SR	3	1	0	4
		SC	0	0	0	0
		SE	0	0	0	0
		WR	0	0	0	0
		METRO	0	0	0	0
		KRC	0	0	0	0
	TOTAL	A	13	5	0	18
		B	.0.0046	0.012	0	0.005

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	CR		ER		NR		NE		NF	
			A	B	A	B	A	B	A	B	A	B
1988-89to 1992-93	1- Defective and broken springs or suspensions.	BG	0	0	1	50	0	0	0	0	0	0
		MG	0	0	0	0	0	0	1	14	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	1	50	0	0	1	14	0	0
	2- Defective or broken axle boxes	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	3- Defective wheel or tyre	BG	1	100	0	0	2	66.7	0	0	0	0
		MG	0	0	0	0	1	50	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	1	100	0	0	3	60	0	0	0	0
	4- Broken of axle or Journal	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	5-Breakage of undergear or brake fittings	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	6-Defective brake	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0

	power	NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	7-Other engine defects	BG	0	0	0	0	1	33.3	1	50	6	86
		MG	0	0	0	0	1	50	6	86	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	2	40	6	0	0	0
	8- Combined effect of defect in engine and track but engine defect being the predominant factor	BG	0	0	1	50	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	1	50	0	0	0	0	0	0
	9-Total	BG	1	100	2	100	3	60	0	0	0	0
		MG	0	0	0	0	2	40	7	100	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	1	100	2	100	5	100	7	100	0	0

Annexure -25

DERAILMENTS DUE TOT DEFECTS IN ENGINES ACCORDING TO NATURE OF DEFECT GAUGE-WISE; RAILWAY-WISE; IN FIVE YEAR BLOCKS.

A =Number of Derailments **B = Number of Derailments due to cause taken as a percentage of the total**

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	SR		SC		SE		WR		METRO	
			A	B	A	B	A	B	A	B	A	B
1988-89to 1992-93	1- Defective and broken springs or suspensions.	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	2- Defective or broken axle boxes	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	3- Defective wheel or tyre	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	4- Broken of axle or	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0

	Journal	NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	5-Breakage of undergear or brake fittings	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	6-Defective brake power	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	7-Other engine defects	BG	0	0	0	0	0	0	0	0	0	0
		MG	1	100	0	0	0	0	1	100	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	1	100	0	0	0	0	1	0	0	0
	8- Combined effect of defect in engine and track but engine defect being the predominant factor	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	9-Total	BG	0	0	0	0	0	0	0	0	0	0
		MG	1	100	0	0	0	0	1	100	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	1	100	0	0	0	0	1	100	0	0

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	KRC		TOTAL	
			A	B	A	B
1988-89to 1992-93	1- Defective and broken springs or suspensions.	BG	0	0	1	16.7
		MG	0	0	1	9.09
		NG	0	0	0	0
		TOTAL	0	0	2	11.8
	2- Defective or broken axle boxes	BG	0	0	0	0
		MG	0	0	0	0
		NG	0	0	0	0
		TOTAL	0	0	0	0
	3- Defective wheel or tyre	BG	0	0	3	50
		MG	0	0	1	9.09
		NG	0	0	0	0
		TOTAL	0	0	4	23.5
	4- Broken of axle or Journal	BG	0	0	0	0
		MG	0	0	0	0
		NG	0	0	0	0
		TOTAL	0	0	0	0
	5-Breakage of undergear or brake fittings	BG	0	0	0	0
		MG	0	0	0	0
		NG	0	0	0	0
		TOTAL	0	0	0	0

	6-Defective brake power	BG	0	0	0	0
		MG	0	0	0	0
		NG	0	0	0	0
		TOTAL	0	0	0	0
	7-Other engine defects	BG	0	0	1	16.7
		MG	0	0	9	81.8
		NG	0	0	0	0
		TOTAL	0	0	10	58.8
	8- Combined effect of defect in engine and track but engine defect being the predominant factor	BG	0	0	1	16.7
		MG	0	0	0	0
		NG	0	0	0	0
		TOTAL	0	0	1	5.88
	9-Total	BG	0	0	6	35.3
		MG	0	0	11	64.7
		NG	0	0	0	0
		TOTAL	0	0	17	100

Annexure -25(Contd.)

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	CR		ER		NR		NE		NF	
			A	B	A	B	A	B	A	B	A	B
1993-94to	1- Defective and broken springs or suspensions.	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0

1997-98		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	2- Defective or broken axle boxes	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	3- Defective wheel or tyre	BG	0	0	0	0	1	16.7	0	0	2	67
		MG	0	0	0	0	0	0	1	33	1	100
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	1	14.3	1	17	3	75
	4- Broken of axle or Journal	BG	0	0	0	0	1	16.7	0	0	0	0
		MG	0	0	0	0	1	100	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	2	28.6	0	0	0	0
	5-Breakage of undergear or brake fittings	BG	0	0	0	0	2	33.3	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	2	28.6	0	0	0	0
	6-Defective brake power	BG	0	0	0	0	0	0	2	67	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	2	33	0	0
	7-Other engine defects	BG	0	0	1	100	2	33.3	0	0	0	0
		MG	0	0	0	0	0	0	2	67	0	0
		NG	0	0	0	0	0	0	0	0	0	0

		TOTAL	0	0	1	100	2	28.6	2	0	0	0
	8- Combined effect of defect in engine and track but engine defect being the predominant factor	BG	0	0	0	0	0	0	1	33	1	33
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	1	17	1	25
	9-Total	BG	0	0	1	100	6	85.7	3	50	3	75
		MG	0	0	0	0	1	14.3	3	50	1	25
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	1	100	7	100	6	100	4	100

PERIOD	**CARRIAGE AND WAGON DEFECTS**	**Gauge**	**SR**		**SC**		**SE**		**WR**		**METRO**	
			A	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
1993-94to 1997-98	1- Defective and broken springs or suspensions.	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	2- Defective or broken axle boxes	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	3- Defective wheel or	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0

	tyre	NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	4- Broken of axle or Journal	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	5-Breakage of undergear or brake fittings	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	6-Defective brake power	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	7-Other engine defects	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	8- Combined effect of defect in engine and track but engine defect being the predominant factor	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0
	9-Total	BG	0	0	0	0	0	0	0	0	0	0
		MG	0	0	0	0	0	0	0	0	0	0
		NG	0	0	0	0	0	0	0	0	0	0
		TOTAL	0	0	0	0	0	0	0	0	0	0

PERIOD	CARRIAGE AND WAGON DEFECTS	Gauge	KRC		TOTAL	
			A	B	A	B
1993-94to 1997-98	1- Defective and broken springs or suspensions.	BG	0	0	0	0
		MG	0	0	0	0
		NG	0	0	0	0
		TOTAL	0	0	0	0
	2- Defective or broken axle boxes	BG	0	0	0	0
		MG	0	0	0	0
		NG	0	0	0	0
		TOTAL	0	0	0	0
	3- Defective wheel or tyre	BG	0	0	3	23
		MG	0	0	2	40
		NG	0	0	0	0
		TOTAL	0	0	5	27.8
	4- Broken of axle or Journal	BG	0	0	1	7.69
		MG	0	0	1	20
		NG	0	0	0	0
		TOTAL	0	0	2	11.1
	5-Breakage of undergear or brake fittings	BG	0	0	2	15.4
		MG	0	0	0	0
		NG	0	0	0	0

		TOTAL	0	0	2	11.1
	6-Defective brake power	BG	0	0	2	15.4
		MG	0	0	0	0
		NG	0	0	0	0
		TOTAL	0	0	2	11.1
	7-Other engine defects	BG	0	0	3	23.1
		MG	0	0	2	40
		NG	0	0	0	0
		TOTAL	0	0	5	27.8
	8- Combined effect of defect in engine and track but engine defect being the predominant factor	BG	0	0	2	15.4
		MG	0	0	0	0
		NG	0	0	0	0
		TOTAL	0	0	2	11.1
	9-Total	BG	0	0	13	72.2
		MG	0	0	5	27.8
		NG	0	0	0	0
		TOTAL	0	0	18	

Annexure -26

Derailments according to miscellaneous causes classified-Railway-wise in 5-year block.

A =Number of derailments **B = No. of derailments due to cause taken as %age of the total**

PERIOD		Miscellaneous Causes	Gauge	CR		ER		NR		NE		NF	
				A	B	A	B	A	B	A	B	A	B
1988-89 to 1992-93	1	Obstruction of track (ballast not clear, tools left on track, goods falling from wagons, infringement of standard dimensions, etc.	BG	2	12.5	8	21.1	3	8.57	2	40	0	0
			MG	0	0	0	0	1	6.25	0	0	1	3.45
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	2	10	8	21.1	4	7.84	2	15.4	1	2.170
	2	Obstruction caused by road vehicles	BG	0	0	1	2.63	3	8.57	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	1	100
			TOTAL	0	0	1	2.63	3	5.88	0	0	1	2.17
	3	Cattle run over	BG	1	6.25	4	10.5	4	11.4	0	0	1	6.25
			MG	0	0	0	0	0	0	2	25	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	1	5	4	10.5	4	7.84	2	15.4	1	2.17

	4	Tampering with track (Sabotage)	BG	3	18.75	1	2.63	9	25.7	0	0	12	75
			MG	0	0	0	0	1	6.25	1	12.5	12	41.4
			NG	0	0	0	0	0	0	0	0	1	100
			TOTAL	3	15	1	2.63	10	19.6	1	7.69	25	54.30
	5	Causes not finally determined	BG	0	0	5	13.2	4	11.4	0	0	2	12.5
			MG	0	0	0	0	0	0	0	0	1	3.45
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	5	13.2	4	7.84	0	0	3	6.52
	6	Accidental (boulders falling on track, landslips, breaches, collapse of bridge, sand on track and there is failure of human element, etc.	BG	7	43.75	2	5.26	3	8.57	0	0	0	0
			MG	0	0	0	0	7	43.8	0	0	1	3.45
			NG	3	75	0	0	0	0	0	0	0	0
			TOTAL	10	50	2	5.26	10	19.6	0	0	1	2.17
	7	Tampering with track not amounting to Sabotage	BG	1	6.25	5	13.2	0	0	0	0	1	6.25
			MG	0	0	0	0	0	0	0	0	3	10.3
			NG	2	50	0	0	0	0	0	0	0	0
			TOTAL	3	15	5	13.2	0	0	0	0	4	8.7
	8	Derailment resulting	BG	0	0	1	2.63	0	0	0	0	0	0

		from train partings	MG	0	0	0	0	0	0	1	12.5	1	3.45
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	1	2.63	0	0	1	7.69	1	2.17
	9	Signal and telecommunication failures	BG	0	0	2	5.26	2	5.71	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	2	5.26	2	3.92	0	0	0	0
	10	Electrical defects	BG	0	0	0	0	0	0	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	0	0	0	0	0	0	0	0
	11	Other Causes	BG	2	12.5	8	21.1	7	20	3	60	0	0
			MG	0	0	0	0	7	43.8	4	50	9	31
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	2	10	8	21.1	14	27.5	7	53.8	9	19.6
	12	Causes not finalised	BG	0	0	1	2.63	0	0	0	0	0	0
			MG	0	0	0	0	0	0	0	0	1	3.45
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	1	2.63	0	0	0	0	1	2.17
	13	Total	BG	16	80	38	100	35	68.6	5	38.5	16	34.8
			MG	0	0	0	0	1	31.4	8	61.5	2	63

								6				9	
			NG	4	20	0	0	0	0	0	0	1	2.17
			TOTAL	20	100	38	100	51	100	13	100	46	100

PERIOD		Miscellaneous Causes	Gauge	SR		SC		SE		WR		METRO	
				A	B	A	B	A	B	A	B	A	B
1988-89 to 1992-93	1	Obstruction of track (ballast not clear, tools left on track, goods falling from wagons, infringement of standard dimensions, etc.	BG	0	0	2	12.5	0	0	2	22.2	0	0
			MG	2	22.2	0	0	0	0	4	36.4	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	2	12.5	2	7.69	0	0	6	30	0	0
	2	Obstruction caused by road vehicles	BG	0	0	1	6.25	0	0	0	0	0	0
			MG	1	11.1	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	1	6.25	1	3.85	0	0	0	0	0	0
	3	Cattle run over	BG	0	0	0	0	0	0	2	22.2	0	0
			MG	2	22.2	0	0	0	0	1	9.09	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	2	12.5	0	0	0	0	3	15	0	0
	4	Tampering with track	BG	1	16.7	6	37.5	0	0	1	11.1	0	0

		(Sabotage)	MG	0	0	6	60	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	1	6.25	12	46.2	0	0	1	5	0	0
	5	Causes not finally determined	BG	1	16.7	3	18.8	0	0	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	1	6.25	3	11.5	0	0	0	0	0	0
	6	Accidental (boulders falling on track, landslips, breaches, collapse of bridge, sand on track and there is failure of human element, etc.	BG	0	0	1	6.25	0	0	2	22.2	0	0
			MG	1	11.1	1	10	0	0	2	18.2	0	0
			NG	1	100	0	0	0	0	0	0	0	0
			TOTAL	2	12.5	2	7.69	0	0	4	20	0	0
	7	Tampering with track not amounting to Sabotage	BG	0	0	0	0	0	0	0	0	0	0
			MG	1	11.1	1	10	1	1	1	9.09	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	1	6.25	1	3.85	0	0	1	5	0	0
	8	Derailment resulting from train partings	BG	3	50	0	0	0	0	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	3	18.8	0	0	0	0	0	0	0	0
	9	Signal and	BG	0	0	0	0	0	0	0	0	0	0

		telecommunication failures	MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	0	0	0	0	0	0	0	0
	10	Electrical defects	BG	0	0	0	0	0	0	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	0	0	0	0	0	0	0	0
	11	Other Causes	BG	1	16.7	2	12.5	0	0	2	22.2	0	0
			MG	3	33.3	3	30	0	0	3	27.3	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	4	25	5	19.2	0	0	5	25	0	0
	12	Causes not finalised	BG	0	0	1	6.25	0	0	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	1	3.85	0	0	0	0	0	0
	13	Total	BG	6	37.5	16	61.5	0	0	9	45	0	0
			MG	9	56.3	10	38.5	0	0	11	55	0	0
			NG	1	6.25	0	0	0	0	0	0	0	0
			TOTAL	16	100	26	100	0	0	20	100	0	0

PERIOD		Miscellaneous Causes	Gauge	KRC		TOTAL	
				A	B	A	B
1988-89 to 1992-93	1	Obstruction of track (ballast not clear, tools left on track, goods falling from wagons, infringement of standard dimensions, etc.	BG	0	0	19	13.48
			MG	0	0	8	9.64
			NG	0	0	0	0.00
			TOTAL	0	0	27	11.74
	2	Obstruction caused by road vehicles	BG	0	0	5	3.55
			MG	0	0	1	1.20
			NG	0	0	1	16.67
			TOTAL	0	0	7	3.04
	3	Cattle run over	BG	0	0	12	8.51
			MG	0	0	5	6.02
			NG	0	0	0	0.00
			TOTAL	0	0	17	7.39
	4	Tampering with track (Sabotage)	BG	0	0	33	23.40
			MG	0	0	20	24.10
			NG	0	0	1	16.67
			TOTAL	0	0	54	23.48
	5	Causes not finally determined	BG	0	0	15	10.64
			MG	0	0	1	1.20
			NG	0	0	0	0.00

			TOTAL	0	0	16	6.96
	6	Accidental (boulders falling on track, landslips, breaches, collapse of bridge, sand on track and there is failure of human element, etc.	BG	0	0	15	10.64
			MG	0	0	12	14.46
			NG	0	0	4	66.67
			TOTAL	0	0	31	13.48
	7	Tampering with track not amounting to Sabotage	BG	0	0	7	4.96
			MG	0	0	6	7.23
			NG	0	0	2	33.33
			TOTAL	0	0	15	6.52
	8	Derailment resulting from train partings	BG	0	0	4	2.84
			MG	0	0	2	2.41
			NG	0	0	0	0.00
			TOTAL	0	0	6	2.61
	9	Signal and telecommunication failures	BG	0	0	4	2.84
			MG	0	0	0	0.00
			NG	0	0	0	0.00
			TOTAL	0	0	4	1.74
	10	Electrical defects	BG	0	0	0	0.00
			MG	0	0	0	0.00
			NG	0	0	0	0.00
			TOTAL	0	0	0	0.00

	11	Other Causes	BG	0	0	25	17.73
			MG	0	0	29	34.94
			NG	0	0	0	0.00
			TOTAL	0	0	54	23.48
	12	Causes not finalised	BG	0	0	2	1.42
			MG	0	0	1	1.20
			NG	0	0	0	0.00
			TOTAL	0	0	3	1.30
	13	Total	BG	0	0	141	61.30
			MG	0	0	83	36.09
			NG	0	0	6	2.61
			TOTAL	0	0	230	100.00

Contd. …/-

PERIOD		Miscellaneous Causes	Gauge	CR		ER		NR		NE		NF	
				A	B	A	B	A	B	A	B	A	B
1988-89 to 1992-93	1	Obstruction of track (ballast not clear, tools left on track, goods falling from wagons, infringement of standard dimensions, etc.	BG	0	0	3	13.6	6	8.82	0	0	1	12.5
			MG	0	0	0	0	0	0	2	33.3	1	7.69
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	3	13.6	6	7.59	2	11.1	2	9.09
	2	Obstruction caused by road vehicles	BG	0	0	0	0	0	0	2	16.7	0	0
			MG	0	0	0	0	1	12.5	0	0	0	0
			NG	0	0	0	0	0	0	0	0	1	100
			TOTAL	0	0	0	0	1	1.27	2	11.1	1	4.55
	3	Cattle run over	BG	1	6.667	2	9.09	8	11.8	3	25	0	0
			MG	0	0	0	0	1	12.5	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	1	6.667	2	9.09	9	11.4	3	16.7	0	0
	4	Tampering with track (Sabotage)	BG	5	33.33	0	0	8	11.8	2	16.7	4	50
			MG	0	0	0	0	2	25	2	33.3	5	38.5
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	5	33.33	0	0	10	12.7	4	22.2	9	40.9
	5	Causes not finally	BG	5	33.33	0	0	4	5.88	0	0	2	25

		determined	MG	0	0	0	0	0	0	0	0	2	15.4
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	5	33.33	0	0	4	5.06	0	0	4	18.2
	6	Accidental (boulders falling on track, landslips, breaches, collapse of bridge, sand on track and there is failure of human element, etc.	BG	3	20	0	0	12	17.6	0	0	0	0
			MG	0	0	0	0	0	0	1	16.7	2	15.4
			NG	0	0	0	0	3	100	0	0	0	0
			TOTAL	3	20	0	0	15	19	1	5.56	2	9.09
	7	Tampering with track not amounting to Sabotage	BG	0	0	10	45.5	3	4.41	1	8.33	0	0
			MG	0	0	0	0	1	12.5	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	10	45.5	4	5.06	1	5.56	0	0
	8	Derailment resulting from train partings	BG	0	0	0	0	0	0	0	0	1	12.5
			MG	0	0	0	0	0	0	0	0	1	7.69
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	0	0	0	0	0	0	2	9.09
	9	Signal and telecommunication failures	BG	0	0	0	0	8	11.8	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	0	0	8	10.1	0	0	0	0

	10	Electrical defects	BG	1	6.667	1	4.55	1	1.47	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	1	6.667	1	4.55	1	1.27	0	0	0	0
	11	Other Causes	BG	0	0	6	27.3	15	22.1	3	25	0	0
			MG	0	0	0	0	3	37.5	0	0	2	15.4
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	6	27.3	18	22.8	3	16.7	2	9.09
	12	Causes not finalised	BG	0	0	0	0	2	2.94	1	8.33	0	0
			MG	0	0	0	0	0	0	1	16.7	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	0	0	2	2.53	2	11.1	0	0
	13	Total	BG	15	100	22	100	68	86.1	12	66.7	8	36.4
			MG	0	0	0	0	8	10.1	6	33.3	13	59.1
			NG	0	0	0	0	3	3.8	0	0	1	4.55
			TOTAL	15	100	22	100	79	100	18	100	22	100

PERIOD		Miscellaneous Causes	Gauge	SR		SC		SE		WR		METRO	
				A	B	A	B	A	B	A	B	A	B
1988-89 to 1992-93	1	Obstruction of track (ballast not clear, tools left on track, goods falling from wagons, infringement of standard dimensions, etc.	BG	0	0	2	10	2	3.13	1	9.09	0	0
			MG	0	0	2	25	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	4	14.3	2	2.9	1	7.14	0	0
	2	Obstruction caused by road vehicles	BG	0	0	1	5	1	1.56	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	1	3.57	1	1.45	0	0	0	0
	3	Cattle run over	BG	0	0	0	0	0	0	1	9.09	0	0
			MG	3	60	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	3	14.3	0	0	0	0	1	7.14	0	0
	4	Tampering with track (Sabotage)	BG	1	6.25	5	25	20	31.3	1	9.09	0	0
			MG	1	20	4	50	0	0	2	66.7	0	0
			NG	0	0	0	0	1	20	0	0	0	0
			TOTAL	2	9.52	9	32.1	21	30.4	3	21.4	0	0
	5	Causes not finally determined	BG	0	0	6	30	15	23.4	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0

			TOTAL	0	0	6	21.4	15	21.7	0	0	0	0
	6	Accidental (boulders falling on track, landslips, breaches, collapse of bridge, sand on track and there is failure of human element, etc.	BG	7	43.8	3	15	0	0	2	18.2	0	0
			MG	1	20	0	0	0	01	33.3		0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	8	38.1	3	10.7	0	0	3	21.4	0	0
	7	Tampering with track not amounting to Sabotage	BG	0	0	3	15	0	0	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	3	10.7	0	0	0	0	0	0
	8	Derailment resulting from train partings	BG	5	31.3	0	0	0	0	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	5	23.8	0	0	0	0	0	0	0	0
	9	Signal and telecommunication failures	BG	1	6.25	0	0	0	0	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	1	4.76	0	0	0	0	0	0	0	0
	10	Electrical defects	BG	0	0	0	0	0	0	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	0	0	0	0	0	0	0	0

	11	Other Causes	BG	2	12.5	0	0	29	45.3	6	54.5	0	0
			MG	0	0	2	25	0	0	0	0	0	0
			NG	0	0	0	0	3	60	0	0	0	0
			TOTAL	2	9.52	2	7.14	32	46.4	6	42.9	0	0
	12	Causes not finalised	BG	0	0	0	0	0	0	0	0	0	0
			MG	0	0	0	0	0	0	0	0	0	0
			NG	0	0	0	0	0	0	0	0	0	0
			TOTAL	0	0	0	0	0	0	0	0	0	0
	13	Total	BG	16	76.2	20	71.4	64	92.8	11	78.6	0	0
			MG	5	23.8	8	28.6	0	0	3	21.4	0	0
			NG	0	0	0	0	5	7.25	0	0	0	0
			TOTAL	21	100	28	100	69	100	14	100	0	0

PERIOD		**Miscellaneous Causes**	**Gauge**	**KRC**		**TOTAL**	
				A	**B**	**A**	**B**
1988-89 to 1992-93	1	Obstruction of track (ballast not clear, tools left on track, goods falling from wagons, infringement of standard dimensions, etc.	BG	0	0	15	6.15
			MG	0	0	5	11.63
			NG	0	0	0	0.00
			TOTAL	0	0	20	6.80
	2	Obstruction caused by road vehicles	BG	0	0	4	1.64
			MG	0	0	1	2.33

			NG	0	0	1	11.11
			TOTAL	0	0	6	2.04
	3	Cattle run over	BG	1	17	16	6.56
			MG	0	0	4	9.30
			NG	0	0	0	0.00
			TOTAL	1	17	20	6.80
	4	Tampering with track (Sabotage)	BG	0	0	46	18.85
			MG	0	0	16	37.21
			NG	0	0	1	11.11
			TOTAL	0	0	63	21.43
	5	Causes not finally determined	BG	0	0	32	13.11
			MG	0	0	2	4.65
			NG	0	0	0	0.00
			TOTAL	0	0	34	11.56
	6	Accidental (boulders falling on track, landslips, breaches, collapse of bridge, sand on track and there is failure of human element, etc.	BG	5	83	32	13.11
			MG	0	0	5	11.63
			NG	0	0	3	33.33
			TOTAL	5	83	40	13.61
	7	Tampering with track not amounting to Sabotage	BG	0	0	17	6.97
			MG	0	0	1	2.33
			NG	0	0	0	0.00

			TOTAL	0	0	18	6.12
	8	Derailment resulting from train partings	BG	0	0	6	2.46
			MG	0	0	1	2.33
			NG	0	0	0	0.00
			TOTAL	0	0	7	2.38
	9	Signal and telecommunication failures	BG	0	0	9	3.69
			MG	0	0	0	0.00
			NG	0	0	0	0.00
			TOTAL	0	0	9	3.06
	10	Electrical defects	BG	0	0	3	1.23
			MG	0	0	0	0.00
			NG	0	0	0	0.00
			TOTAL	0	0	3	1.02
	11	Other Causes	BG	0	0	61	25.00
			MG	0	0	7	16.28
			NG	0	0	3	33.33
			TOTAL	0	0	71	24.15
	12	Causes not finalised	BG	0	0	3	1.23
			MG	0	0	1	2.33
			NG	0	0	0	0.00
			TOTAL	0	0	4	1.36
	13	Total	BG	6	100	24	82.99

						4	
			MG	0	0	43	14.63
			NG	0	0	9	3.06
			TOTAL	6	100	294	100.00

Annexure -27

Casualties and Damages to Railway properties due to Derailments on all Gauges; Railway-wise; in five-year blocks

Period	Railway	Total number of derailments	Casualties			Damage i.e. loss in lakhs of rupees
			Killed	Injured	Total	
88-89 to 92-93	CR	212	100	306	406	2395.35
	ER	254	53	145	198	855.8
	NR	331	82	272	354	1297.79
	NE	100	2	39	41	207.00
	NF	240	17	163	180	178.00
	SR	267	141	347	488	220.00
	SC	233	18	263	281	4497.68
	SE	782	46	201	247	6810.50
	WR	208	16	92	108	474.65

	Metro	0	0	0	0	0.00
	KRC	0	0	0	0	0
	Total	2627	475	1828	2303	16936.77

Period	**Railway**	**Total number of derailments**	**Casualties**			**Damage I.e. loss in lakhs of rupees**
			Killed	**Injured**	**Total**	
93-94 to 97-98	CR	220	29	148	177	3118.8
	ER	131	14	83	97	2616.74
	NR	376	31	78	109	2189.52
	NE	82	32	211	243	64.36
	NF	141	45	116	161	635.00
	SR	184	8	36	44	1485.00
	SC	174	11	160	171	9622.36
	SE	525	120	553	673	10105.20
	WR	172	4	124	128	982.3
	Metro	2	0	0	0	7.00
	KRC	6	0	11	11	52.81
	Total	2013	294	1520	1814	30879.09

Annexure-28

Derailments- an analysis on type of rolling stock for the period 1993-94 to 1997-98 Railway-wise, year wise.

year		Type of rolling stock	CR	ER	NR	NE	NF	SR	SC	SE	WR	Metro	KRC	Total
1993 -94	1	CRT/CRC	20	1	28	2	32	15	13	11	5	0	0	127
	2	OIL TANK	13	0	10	0	38	5	2	21	3	0	0	92
	3	BOX	11	12	27	0	3	1	9	65	9	0	0	137
	4	BCN	15	4	7	1	9	1	3	6	0	0	0	46
	5	BCX	6	2	10	1	22	1	3	12	1	0	0	58
	6	BFK	1	1	1	0	0	3	0	6	1	0	0	13
	7	BKH	0	0	0	0	4	0	1	0	0	0	0	5
	8	BVG/Others*	0	0	0	1	0	*3	0	0	1	0	0	4
	9	BOBC	0	0	0	0	0	0	0	2	0	0	0	2
	10	LOCO	3	2	3	0	9	1	0	4	0	0	0	22
	11	BVG	6	0	1	0	6	0	0	0	1	0	0	14
	12	BC(MG)	0	0	1	9	52	1	9	0	6	0	0	78
	13	TOTAL	75	22	88	14	175	31	40	127	27	0	0	598
	14	PASSR. TRAIN DERAILMENTS	10	15	24	11	28	5	7	19	10	0	0	129

	15	GRAND TOTAL	85	37	112	25	203	36	47	146	37	0	0	727

year		Type of rolling stock	CR	ER	NR	NE	NF	SR	SC	SE	WR	Metro	KRC	Total
1994 -95	1	CRT/CRC	24	3	19	0	22	7	4	8	8	0	0	95
	2	OIL TANK	16	3	12	1	88	3	3	17	4	0	0	147
	3	BOX	10	2	23	0	6	3	6	46	7	0	0	103
	4	BCN	5	4	8	0	31	4	2	1	1	0	0	56
	5	BCX	6	3	7	0	11	2	2	14	2	0	0	47
	6	BFK	0	1	0	0	1	1	0	1	2	0	0	6
	7	BKH	0	0	3	0	4	0	0	0	0	0	0	7
	8	BVG/Others*	1	0	0	1	0	2*	1	0	0	0	0	3
	9	BOBC	0	0	5	0	0	0	1	1	0	0	0	7
	10	LOCO	3	2	2	0	12	1	0	6	0	0	0	26
	11	BVG	0	0	0	0	0	0	0	0	0	0	0	0
	12	BC(MG)	0	0	0	1	41	0	3	0	0	0	0	45
	13	TOTAL	65	18	79	3	216	23	22	94	24	0	0	544
	14	PASSR. TRAIN DERAILMENTS	12	10	23	13	53	8	17	18	15	0	0	169
	15	GRAND TOTAL	77	28	102	16	269	31	39	112	39	0	0	713

year		Type of rolling stock	CR	ER	NR	NE	NF	SR	SC	SE	WR	Metro	KRC	Total
1995-96	1	CRT/CRC	10	0	8	2	1	4	7	0	3	0	0	35
	2	OIL TANK	17	0	1	1	31	7	3	20	5	0	0	85
	3	BOX	6	9	19	0	18	2	2	40	5	0	0	101
	4	BCN	11	2	1	0	12	3	2	9	2	0	0	42
	5	BCX	2	0	3	2	6	5	2	5	0	0	0	25
	6	BFK	0	1	0	0	0	1	0	0	0	0	0	2
	7	BKH	0	0	1	0	0	0	0	0	0	0	0	1
	8	BVG/Others*	0	0	0	1	0	1	0	1	0	0	0	3
	9	BOBC	0	0	2	1	0	0	0	0	0	0	0	3
	10	LOCO	0	1	1	2	4	0	0	4	0	0	0	12
	11	BVG	1	0	0	0	0	0	0	0	0	0	0	1
	12	BC(MG)	0	0	0	0	26	2	0	0	4	0	0	32
	13	TOTAL	47	13	36	9	98	25	16	79	19	0	0	342
	14	PASSR. TRAIN DERAILMENTS	13	11	15	12	31	10	11	24	9	0	0	136
	15	GRAND TOTAL	60	24	51	21	129	35	27	103	28	0	0	478

year		Type of rolling stock	CR	ER	NR	NE	NF	SR	SC	SE	WR	Metro	KRC	Total
1996-97	1	CRT/CRC	10	1	14	1	5	6	2	0	7	2	2	46
	2	OIL TANK	4	0	6	0	49	6	4	5	2	1	1	76
	3	BOX	6	3	16	0	1	4	9	33	10	0	0	82
	4	BCN	3	2	7	0	26	2	4	4	1	0	0	49
	5	BCX	4	2	1	1	1	2	2	4	1	2	2	18
	6	BFK	0	0	3	0	0	1	0	1	1	0	0	6
	7	BKH	1	0	2	0	0	0	0	0	0	0	0	3
	8	BVG/Others*	0	0	0	0	0	0	0	0	0	1	1	0
	9	BOBC	0	0	1	0	11	1	0	6	0	1	1	19
	10	LOCO	0	2	1	0	10	2	0	11	0	2	2	26
	11	BVG	0	0	0	0	2	0	0	0	0	0	0	2
	12	BC(MG)	0	0	1	0	5	1	0	0	1	0	0	8
	13	TOTAL	28	10	52	2	110	25	21	64	23	9	9	335
	14	PASSR. TRAIN DERAILMENTS	22	10	19	5	45	4	10	19	11	1	3	149
	15	GRAND TOTAL	50	20	71	7	155	29	31	83	34	1	3	484

year		Type of rolling stock	CR	ER	NR	NE	NF	SR	SC	SE	WR	Metro	KRC	Total
1997-98	1	CRT/CRC	13	0	4	1	1	10	5	0	5	2	2	39
	2	OIL TANK	12	5	3	1	42	13	3	0	2	1	1	81
	3	BOX	6	4	9	0	6	3	11	37	7	0	0	83
	4	BCN	10	3	2	2	0	4	0	2	2	0	0	25
	5	BCX	4	1	4	1	3	2	1	1	0	2	2	17
	6	BFK	0	0	0	0	0	0	1	7	0	0	0	8
	7	BKH	0	0	1	0	0	0	0	0	0	0	0	1
	8	BVG/Others*	0	0	0	0	0	1	0	0	0	1	1	1
	9	BOBC	0	0	1	0	1	0	0	2	0	1	1	4
	10	LOCO	0	4	0	0	7	3	1	5	0	2	2	20
	11	BVG	0	0	0	0	0	0	0	0	1	0	0	1
	12	BC(MG)	0	0	0	0	16	3	0	0	0	0	0	19
	13	TOTAL	45	17	24	5	76	39	22	54	17	9	9	299
	14	PASSR. TRAIN DERAILMENTS	19	5	16	8	25	14	8	16	21	12	12	136
	15	GRAND TOTAL	64	22	40	13	101	53	30	70	38	1	3	435

Annexure – 29

Rate of Accidents per Manned/ Un-manned Level Crossings-Railway-wise in 5-year blocks.

Period	Railway	Manned Level Crossings			Un-manned level Crossings			Manned and Un-manned level Crossings		
		Number of Level crossings	Number of accidents per year	Rate of accidents per manned level crossing	Number of Level crossings	Number of accidents per year	Rate of accidents per un-manned level crossing	Total no. of manned and un-manned level Crossings	Number of accidents per year	Rate of accidents per manned & un-manned level Crossing
	CR	1713	8	0.00467	1723	16	0.00929	3436	24	0.006985
	ER	1302	14	0.01075	848	1	0.00118	2150	15	0.006977
	NR	3224	27	0.00837	4529	31	0.00684	7753	58	0.007481
	NE	1516	6	0.00396	2571	24	0.00933	4087	30	0.00734
	NF	654	0	0	1701	5	0.00294	2355	5	0.002123
	SR	2093	7	0.00334	2282	26	0.01139	4375	33	0.007543
	SC	1396	1	0.00072	2162	15	0.00694	3558	16	0.004497
	SE	998	11	0.01102	3395	24	0.00707	4393	35	0.007967
	WR	2928	10	0.00342	4105	27	0.00658	7033	37	0.005261
	Metro	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	Total	15824	84	0.00531	23316	169	0.00725	39140	253	0.006464

Period	Railway	Manned Level Crossings			Un-manned level Crossings			Manned and Un-manned level Crossings		
		Number of Level crossings	Number of accidents per year	Rate of accidents per manned level crossing	Number of Level crossings	Number of accidents per year	Rate of accidents per un-manned level crossing	Total no. of manned and un-manned level Crossings	Number of accidents per year	Rate of accidents per manned & un-manned level Crossing
93-94 to 97-98	CR	1802	7	0.00388	1684	11	0.00653	3486	18	0.005164
	ER	1323	8	0.00605	668	2	0.00299	1991	10	0.005023
	NR	3172	24	0.00757	4406	51	0.01158	7578	75	0.009897
	NE	1446	6	0.00415	2614	36	0.01377	4060	42	0.010345
	NF	760	3	0.00395	1498	8	0.00534	2258	11	0.004872
	SR	2191	10	0.00456	2283	63	0.0276	4474	73	0.016316
	SC	1486	8	0.00538	2019	34	0.01684	3505	42	0.011983
	SE	1014	11	0.01085	3296	14	0.00425	4310	25	0.0058
	WR	2935	9	0.00307	4098	40	0.00976	7033	49	0.006967
	Metro	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	Total	16129	86	0.00533	22566	259	0.01148	38695	38695	0.008916

Annexure -30

NUMBER OF ACCIDENTS AT MANNED AND UNMANNED LEVEL CROSSING ON THE BROAD, METRE AND NARROW GAUGES TAKING PASSENGER AND OTHER TRAINS SEPARATELY-RAILWAY-WISE IN 5-YEAR BLOCK.

Period	Railway	Manned Level Crossings			level Crossings			and Un-manned		
		Manned	Un-manned	All level Crossings	Manned	Un-manned	All level Crossings	Manned	Un-manned	All level Crossings
88-89 to 92-93	CR	7	15	22	1	1	2	8	16	24
	ER	13	1	14	1	0	1	14	1	15
	NR	20	28	48	7	3	10	27	31	58
	NE	4	22	26	2	2	4	6	24	30
	NF	0	5	5	0	0	0	0	5	5
	SR	5	25	30	2	1	3	7	26	33
	SC	1	13	14	0	2	2	1	15	16
	SE	5	15	20	6	9	15	11	24	35
	WR	9	23	32	1	4	5	10	27	37
	Metro	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	Total	64	147	211	20	22	42	84	169	253

Period	Railway	Manned Level Crossings			level Crossings			and Un-manned		
		Manned	Un-manned	All level Crossings	Manned	Un-manned	All level Crossings	Manned	Un-manned	All level Crossings
93-94 to 97-98	CR	4	10	14	3	1	4	7	11	18
	ER	8	2	10	0	0	0	8	2	10
	NR	18	42	60	6	9	15	24	51	75
	NE	6	33	39	0	3	3	6	36	42
	NF	1	7	8	2	1	3	3	8	11
	SR	8	56	64	2	7	9	10	63	73
	SC	6	30	36	2	4	6	8	34	42
	SE	10	11	21	1	3	4	11	14	25
	WR	6	28	34	3	12	15	9	40	49
	Metro	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	Total	67	219	286	19	40	59	86	259	345

Annexure -31

Number and incidence of accidents at Manned and un-manned level crossings involving passenger and other trains-Gauge-wise; Railway wise in 5-year block.

A = Number of accidents B = Incidence of accidents per million

1988-89 to 192-93										
		Number of Accidents								
Trains	Railway	Broad Gauge			Metre Gauge			Narrow Gauge		
		Manned	Un-manned	Total	Manned	Un-manned	Total	Manned	Un-manned	Total
passenger	CR	7	13	20	0	0	0	0	2	2
	ER	13	1	14	0	0	0	0	0	0
	NR	19	20	39	1	8	9	0	0	0
	NE	0	6	6	4	16	20	0	0	0
	NF	0	0	0	0	4	4	0	1	1
	SR	2	7	9	3	17	20	0	1	1
	SC	1	6	7	0	7	7	0	0	0
	SE	5	12	17	0	0	0	0	3	3
	WR	4	9	13	5	14	19	0	0	0
	Metro	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	Total A	51	74	125	13	66	79	0	7	7
	B	0.04	0.05	0.09	0.03	0.16	0.19	0	0.17	0.17

passenger train/ other train kilometres

1988-89 to 192-93				
		Number of Accidents		
Trains	Railway	All Gauge		
		Manned	Un-manned	Total
passenger	CR	7	15	22
	ER	13	1	14
	NR	20	28	48
	NE	4	22	26
	NF	0	5	5
	SR	5	25	30
	SC	1	13	14
	SE	5	15	20
	WR	9	23	32
	Metro	0	0	0
	KRC	0	0	0
	Total A	64	147	211
	B	0.03	0.08	0.11

1988-89 to 192-93										
		Number of Accidents								
Trains	Railway	Broad Gauge			Metre Gauge			Narrow Gauge		
		Manned	Un-manned	Total	Manned	Un-manned	Total	Manned	Un-manned	Total
other	CR	1	1	2	0	0	0	0	0	0
	ER	1	0	1	0	0	0	0	0	0
	NR	7	3	10	0	0	0	0	0	0
	NE	0	1	1	2	1	3	0	0	0
	NF	0	0	0	0	0	0	0	0	0
	SR	2	1	3	0	0	0	0	0	0
	SC	0	1	1	0	1	1	0	0	0
	SE	6	8	14	0	0	0	0	1	1
	WR	0	2	2	1	2	3	0	0	0
	Metro	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	Total A	17	17	34	3	4	7	0	1	1
	B	0.016	0.016	0.03	0.01	0.02	0.03	0	0.13	0.13

1988-89 to 192-93				
		Number of Accidents		
Trains	Railway			All Gauge
		Manned	Un-manned	Total
other	CR	1	1	2
	ER	1	0	1
	NR	7	3	10
	NE	2	2	4
	NF	0	0	0
	SR	2	1	3
	SC	0	2	2
	SE	6	9	15
	WR	1	4	5
	Metro	0	0	0
	KRC	0	0	0
	Total A	20	22	42
	B	0.01	0.02	0.03

1993-94 to 1997-98										
		Number of Accidents								
Trains	Railway	Broad Gauge			Metre Gauge			Narrow Gauge		
		Manned	Un-manned	Total	Manned	Un-manned	Total	Manned	Un-manned	Total
passenger	CR	4	7	11	0	0	0	0	3	3
	ER	8	2	10	0	0	0	0	0	0
	NR	18	38	56	0	4	4	0	0	0
	NE	4	17	21	2	16	18	0	0	0
	NF	0	4	4	1	3	4	0	0	0
	SR	6	23	29	2	31	33	0	2	2
	SC	4	27	31	2	3	5	0	0	0
	SE	8	9	17	0	0	0	2	2	4
	WR	4	10	14	2	18	20	0	0	0
	Metro	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	Total A	56	137	193	9	75	84	2	7	9
	B	0.03	0.08	0.12	0.03	0.23	0.26	0.06	0.20	0.25

1993-94 to 1997-98				
		Number of Accidents		
Trains	Railway	All Gauge		
		Manned	Un-manned	Total
other	CR	4	10	14
	ER	8	2	10
	NR	18	42	60
	NE	6	33	39
	NF	1	7	8
	SR	8	56	64
	SC	6	30	36
	SE	10	11	21
	WR	6	28	34
	Metro	0	0	0
	KRC	0	0	0
	Total A	67	209	286
	B	0.03	0.11	0.14

1993-94 to 1997-98										
		Number of Accidents								
Trains	Railway	Broad Gauge			Metre Gauge			Narrow Gauge		
		Manned	Un-manned	Total	Manned	Un-manned	Total	Manned	Un-manned	Total
other	CR	3	1	4	0	0	0	0	0	0
	ER	0	0	0	0	0	0	0	0	0
	NR	6	8	14	0	1	1	0	0	0
	NE	0	1	1	0	2	2	0	0	0
	NF	0	1	1	2	0	2	0	0	0
	SR	2	6	8	0	1	1	0	0	0
	SC	2	3	5	0	1	1	0	0	0
	SE	1	2	3	0	0	0	0	1	1
	WR	2	9	11	1	3	4	0	0	0
	Metro	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	Total A	16	31	47	3	8	11	0	1	1
	B	0.01	0.03	0.04	0.03	0.08	0.10	0	0.23	0.23

1993-94 to 1997-98				
		Number of Accidents		
Trains	Railway	All Gauge		
		Manned	Un-manned	Total
other	CR	3	1	4
	ER	0	0	0
	NR	6	9	15
	NE	0	3	3
	NF	2	1	3
	SR	2	7	9
	SC	2	4	6
	SE	1	3	4
	WR	3	12	15
	Metro	0	0	0
	KRC	0	0	0
	Total A	19	40	59
	B	0.015	0.031	0.046

Annexure -32

CASUALTIES AND LOSS DUE TO DAMAGE TO RAILWAY PROPERTIES IN ACCIDENTS AT LEVEL CROSSINGS- ALL GAUGES COMBINED RAILWAY-WISE IN 5-YEAR BLOCKS.

Trains	Railway	Total Number of Accidents at level Crossings		
		Manned	Un-manned	Total
1988-89 to 93-94	CR	8	16	24
	ER	14	1	15
	NR	27	31	58
	NE	6	24	30
	NF	0	5	5
	SR	7	26	33
	SC	1	15	16
	SE	11	24	35
	WR	10	27	37
	Metro	0	0	0
	KRC	0	0	0
	Total	84	169	253

		CASUALTIES								
Period	**Railway**	**KILLED**			**INJURED**			**TOTAL**		
		Manned	**Un-manned**	**TOTAL**	**Manned**	**Un-manned**	**TOTAL**	**Manned**	**Un-manned**	**TOTAL**
88-89 to 93-94	CR	20	28	48	23	75	98	43	103	146
	ER	19	7	26	17	28	45	36	35	71
	NR	40	51	91	141	74	215	181	125	306
	NE	1	48	49	25	54	79	26	102	128
	NF	0	9	9	0	2	2	0	11	11
	SR	2	36	38	6	100	106	8	136	144
	SC	2	18	20	24	22	46	26	40	66
	SE	35	29	64	69	53	122	104	82	186
	WR	15	38	53	119	193	312	134	231	365
	Metro	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	Total	134	264	398	424	601	1025	558	865	1423

1988-89 to 93-94				
Trains	Railway	Cost of damages (Rs. In Lakhs)		
		Manned	Un-manned	Total
	CR	1.57	0.23	1.8
	ER	0.83	0	0.83
	NR	2.24	1.624	3.864
	NE	0.14	0.75	0.89
	NF	0	0.2	0.2
	SR	0.66	0.49	1.15
	SC	0.02	0.32	0.34
	SE	2.02	6.16	8.18
	WR	0.605	0.798	1.403
	Metro	0	0	0
	KRC	0	0	0
	Total	8.085	10.572	18.66

Trains	Railway	Total Number of Accidents at level Crossings		
		Manned	Un-manned	Total
93-94 to 97-98	CR	7	11	18
	ER	8	2	10
	NR	24	51	75
	NE	6	36	42
	NF	3	8	11
	SR	10	63	73
	SC	8	34	42
	SE	11	14	25
	WR	9	40	49
	Metro	0	0	0
	KRC	0	0	0
	Total	86	259	345

Period	Railway	CASUALTIES								
		KILLED			INJURED			TOTAL		
		Manned	Un-manned	TOTAL	Manned	Un-manned	TOTAL	Manned	Un-manned	TOTAL
93-94 to 97-98	CR	29	25	54	66	68	134	95	93	188
	ER	24	4	28	39	4	43	63	8	71
	NR	52	158	210	63	125	188	115	283	398
	NE	35	106	141	14	52	66	49	158	207
	NF	1	28	29	9	86	95	10	114	124
	SR	23	100	123	16	113	129	39	213	252
	SC	9	179	188	21	165	186	30	344	374
	SE	12	35	47	14	58	72	26	93	119
	WR	4	24	28	65	127	192	69	151	220
	Metro	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	Total	189	659	848	307	798	1105	496	1457	1953

93-94 to 97-98				
		Cost of damages (Rs. In Lakhs)		
Trains	Railway	Manned	Un-manned	Total
	CR	28.32	12.3	40.62
	ER	2.361	0	2.361
	NR	1.34	1.23	2.57
	NE	0.67	4.3	4.97
	NF	0.5	0.65	1.2
	SR	0.21	6.1	6.31
	SC	0.11	49.92	50.03
	SE	10.36	0.05	10.41
	WR	0.412	0.661	1.073
	Metro	0	0	0
	KRC	0	0	0
	Total	14.283	75.211	119.5

Annexure-33

Accidents at manned level Crossings- cause-wise; Railway-wise during 1993-94 to 1997-98

A-No. of accidents **B-Percentage to total**

year		Causes of accidents	CR		ER		NR		NE		NF		SR	
			A	B	A	B	A	B	A	B	A	B	A	B
1993-94	1	Due to open or improperly closed or secured gates	0	0	0	0	3	43	0	0	0	0	0	0
	2	Road vehicles coming over the level-Xings where barriers on the other side had been closed	0	0	0	0	0	0	0	0	0	0	0	0
	3	Road vehicles crashing into the lifting or swing type gates or	0	0	0	0	1	14	0	0	0	0	0	0

		breaking the lock and opening it												
	4	Road vehicles breaking or opening the chains at level -Xing closed by chains	0	0	0	0	0	0	0	0	0	0	0	0
	5	Road vehicles left at L-Xings or infringing the track	0	0	0	0	0	0	0	0	0	0	0	0
	6	Disregard of signals by Drivers	0	0	0	0	2	29	0	0	0	0	0	0
	7	Non-issue of caution order to Driver when gate telephone out of order	0	0	0	0	0	0	0	0	0	0	0	0
	8	Gate kept open to road traffic	1	0	0	0	1	14	0	0	0	0	0	0

		despite telephonic intimation/train passage												
	9	Other causes	0	0	0	0	0	0	0	0	0	0		
	10	TOTAL	1	100	0	0	7	100	0	0	0	0	0	0

year		**Causes of accidents**	**SC**		**SE**		**WR**		**KRC**		**METRO**		**TOTAL**	
1993-94			**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	1	Due to open or improperly closed or secured gates	1	0	0	0	2	100	0	0	0	0	6	46.2
	2	Road vehicles coming over the level-Xings where barriers on the other side had been closed	0	0	2	100	0	0	0	0	0	0	2	15.4
	3	Road vehicles crashing into	0	0	0	0	0	0	0	0	0	0	1	7.7

		the lifting or swing type gates or breaking the lock and opening it												
	4	Road vehicles breaking or opening the chains at level -Xing closed by chains	0	0	0	0	0	0	0	0	0	0	0	0.0
	5	Road vehicles left at L-Xings or infringing the track	0	0	0	0	0	0	0	0	0	0	0	0.0
	6	Disregard of signals by Drivers	0	0	0	0	0	0	0	0	0	0	2	15.4
	7	Non-issue of caution order to Driver when gate telephone	0	0	0	0	0	0	0	0	0	0	0	0.0

		out of order												
	8	Gate kept open to road traffic despite telephonic intimation/train passage	0	0	0	0	0	0	0	0	0	0	2	15.4
	9	Other causes	0	0	0	0	0	0	0	0	0	0	0	0.0
	10	TOTAL	1	0	2	100	2	100	0	0	0	0	13	100.0

year		**Causes of accidents**	**CR**		**ER**		**NR**		**NE**		**NF**		**SR**	
1993-94			**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	1	Due to open or improperly closed or secured gates	0	0	0	0	1	33	1	50	0	0	0	0
	2	Road vehicles coming over the level-Xings where barriers on the other side had been	0	0	1	100	0	0	0	0	0	0	0	0

		closed												
	3	Road vehicles crashing into the lifting or swing type gates or breaking the lock and opening it	0	0	0	0	2	67	0	0	0	0	1	0
	4	Road vehicles breaking or opening the chains at level -Xing closed by chains	0	0	0	0	0	0	1	50	0	0	0	0
	5	Road vehicles left at L-Xings or infringing the track	0	0	0	0	0	0	0	0	0	0	0	0
	6	Disregard of signals by Drivers	0	0	0	0	1	33	0	0	0	0	2	0
	7	Non-issue of	0	0	0	0	0	0	0	0	0	0	0	0

		caution order to Driver when gate telephone out of order											
	8	Gate kept open to road traffic despite telephonic intimation/train passage	0	0	0	0	0	0	0	0	0	0	2	0
	9	Other causes	0	0	0	0	0	0	0	0	0	0	1	0
	10	TOTAL	0	0	1	100	4	100	2	100	0	0	6	0

year		**Causes of accidents**	**SC**		**SE**		**WR**		**KRC**		**METRO**		**TOTAL**	
1994-95			**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	1	Due to open or improperly closed or secured gates	1	0	1	100	0	0	0	0	0	0	7	43.6
	2	Road vehicles coming over the level-Xings	0	0	0	0	0	0	0	0	0	0	0	0.0

		where barriers on the other side had been closed												
	3	Road vehicles crashing into the lifting or swing type gates or breaking the lock and opening it	1	0	0	0	0	0	0	0	0	0	5	31.3
	4	Road vehicles breaking or opening the chains at level -Xing closed by chains	0	0	0	0	0	0	0	0	0	0	0	0.0
	5	Road vehicles left at L-Xings or infringing the track	0	0	0	0	0	0	0	0	0	0	0	0.0
	6	Disregard of	0	0	0	0	0	0	0	0	0	0	0	0.0

		signals by Drivers											
	7	Non-issue of caution order to Driver when gate telephone out of order	0	0	0	0	0	0	0	0	0	0	0	0.0
	8	Gate kept open to road traffic despite telephonic intimation/train passage	0	0	0	0	0	0	0	0	0	0	4	25.0
	9	Other causes	0	0	0	0	0	0	0	0	0	0	0	0.0
	10	TOTAL	2	0	1	100	0	0	0	0	0	0	16	100.0

year		**Causes of accidents**	**CR**		**ER**		**NR**		**NE**		**NF**		**SR**	
1995-96			**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	1	Due to open or improperly	0	0	0	0	4	80	0	0	1	100	0	0

		closed or secured gates												
	2	Road vehicles coming over the level-Xings where barriers on the other side had been closed	0	0	0	0	0	0	0	0	0	0	0	0
	3	Road vehicles crashing into the lifting or swing type gates or breaking the lock and opening it	1	50	1	50	1	20	1	100	0	0	0	0
	4	Road vehicles breaking or opening the chains at level -Xing closed by chains	0	0	0	0	0	0	0	0	0	0	0	0
	5	Road vehicles	0	0	0	0	0	0	0	0	0	0	0	0

		left at L-Xings or infringing the track												
	6	Disregard of signals by Drivers	0	0	0	0	0	0	0	0	0	0	0	0
	7	Non-issue of caution order to Driver when gate telephone out of order	0	0	0	0	0	0	0	0	0	0	0	0
	8	Gate kept open to road traffic despite telephonic intimation/train passage	1	0	1	50	0	0	0	0	0	0	2	0
	9	Other causes	0	0	0	0	0	0	0	0	0	0	0	0
	10	TOTAL	2	100	2	100	5	100	1	100	1	100	2	0

year		**Causes of**	**CR**		**ER**		**NR**		**NE**		**NF**		**SR**	
1996-		**accidents**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**

97	1	Due to open or improperly closed or secured gates	0	0	0	0	3	60	0	0	0	0	0	0
	2	Road vehicles coming over the level-Xings where barriers on the other side had been closed	0	0	2	50	0	0	0	0	0	0	0	0
	3	Road vehicles crashing into the lifting or swing type gates or breaking the lock and opening it	1	25	0	0	2	40	1	100	0	0	0	0
	4	Road vehicles breaking or opening the chains at level	0	0	0	0	0	0	0	0	0	0	0	0

		-Xing closed by chains												
	5	Road vehicles left at L-Xings or infringing the track	0	0	0	0	0	0	0	0	0	0	0	0
	6	Disregard of signals by Drivers	0	0	1	25	0	0	0	0	0	0	0	0
	7	Non-issue of caution order to Driver when gate telephone out of order	0	0	0	0	0	0	0	0	0	0	0	0
	8	Gate kept open to road traffic despite telephonic intimation/train passage	3	75	0	0	0	0	0	0	0	0	0	0
	9	Other causes	0	0	1	25	0	0	0	0	0	0	1	0
	10	TOTAL	4	100	4	100	5	100	1	100	0	0	1	0

year		Causes of accidents	SC		SE		WR		KRC		METRO		TOTAL	
1996-97			A	B	A	B	A	B	A	B	A	B	A	B
	1	Due to open or improperly closed or secured gates	1	0	1	50	1	50	0	0	0	0	6	28.6
	2	Road vehicles coming over the level-Xings where barriers on the other side had been closed	0	0	0	0	0	0	0	0	0	0	2	9.5
	3	Road vehicles crashing into the lifting or swing type gates or breaking the lock and opening it	1	0	0	0	0	0	0	0	0	0	5	23.8
	4	Road vehicles breaking or	0	0	0	0	0	0	0	0	0	0	0	0.0

		opening the chains at level -Xing closed by chains												
	5	Road vehicles left at L-Xings or infringing the track	0	0	0	0	0	0	0	0	0	0	0	0.0
	6	Disregard of signals by Drivers	0	0	1	50	0	0	0	0	0	0	2	9.5
	7	Non-issue of caution order to Driver when gate telephone out of order	0	0	0	0	0	0	0	0	0	0	0	0.0
	8	Gate kept open to road traffic despite telephonic intimation/train passage	0	0	0	0	0	0	0	0	0	0	3	14.3
	9	Other causes	0	0	0	0	1	50	0	0	0	0	3	14.3

	10	TOTAL	2	0	2	100	2	100	0	0	0	0	21	100.0

year		**Causes of accidents**	**CR**		**ER**		**NR**		**NE**		**NF**		**SR**	
1997-98			**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	1	Due to open or improperly closed or secured gates	0	0	0	0	1	33	0	0	1	50	1	0
	2	Road vehicles coming over the level-Xings where barriers on the other side had been closed	0	0	0	0	0	0	0	0	0	0	0	0
	3	Road vehicles crashing into the lifting or swing type gates or breaking the lock and	0	0	1	100	2	67	0	0	0	0	0	0

		opening it												
	4	Road vehicles breaking or opening the chains at level -Xing closed by chains	0	0	0	0	0	0	0	0	0	0	0	0
	5	Road vehicles left at L-Xings or infringing the track	0	0	0	0	0	0	0	0	0	0	0	0
	6	Disregard of signals by Drivers	0	0	0	0	0	0	1	50	1	50	0	0
	7	Non-issue of caution order to Driver when gate telephone out of order	0	0	0	0	0	0	0	0	0	0	0	0
	8	Gate kept open to road traffic despite telephonic	0	0	0	0	0	0	1	50	0	0	0	0

		intimation/train passage												
	9	Other causes	0	0	0	0	0	0	0	0	0	0	0	0
	10	TOTAL	0	0	1	100	3	100	2	100	2	100	1	0

year		**Causes of accidents**	**SC**		**SE**		**WR**		**KRC**		**METRO**		**TOTAL**	
1997-98			**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
	1	Due to open or improperly closed or secured gates	0	0	3	75	0	0	0	0	0	0	6	37.5
	2	Road vehicles coming over the level-Xings where barriers on the other side had been closed	0	0	0	0	0	0	0	0	0	0	0	0.0
	3	Road vehicles crashing into the lifting or swing type	1	0	0	0	0	0	0	0	0	0	4	25.0

		gates or breaking the lock and opening it												
	4	Road vehicles breaking or opening the chains at level -Xing closed by chains	0	0	1	25	0	0	0	0	0	0	16.3	
	5	Road vehicles left at L-Xings or infringing the track	0	0	0	0	0	0	0	0	0	0	0	0.0
	6	Disregard of signals by Drivers	0	0	0	0	2	100	0	0	0	0	4	25.0
	7	Non-issue of caution order to Driver when gate telephone out of order	0	0	0	0	0	0	0	0	0	0	0	0.0
	8	Gate kept open	0	0	0	0	0	0	0	0	0	0	1	6.3

		to road traffic despite telephonic intimation/train passage												
	9	Other causes	0	0	0	0	0	0	0	0	0	0	0	0.0
	10	TOTAL	1	0	4	100	2	100	0	0	0	0	16	100.0

Annexure – 34

Accidents at Level Crossings-provided/not provided with telephones-Railway-wise; year-wise for the years 1993-94 to 1997-98

year	RLY	Special "A" Class	"A" Class	"B" Class	"C" Class		Total
					With telephone	Without Telephone	
1993-94	CR	0	0	0	1	0	1
	ER	0	0	0	0	0	0
	NR	0	4	0	2	0	6
	NE	0	0	0	0	0	0
	NF	0	0	1	0	0	1
	SR	0	0	0	0	0	0
	SC	0	0	1	0	0	1
	SE	0	1	1	0	0	2

	WR	0	0	0	2	0	2
	KRC	0	0	0	0	0	0
	METRO	0	0	0	0	0	0
	TOTAL	0	5	3	5	0	13

year	**RLY**	**Special "A" Class**	**"A" Class**	**"B" Class**	**"C" Class**		**Total**
					With telephone	**Without Telephone**	
1994-95	CR	0	0	0	0	0	0
	ER	0	0	1	0	0	1
	NR	0	0	0	4	0	4
	NE	0	0	1	1	0	2
	NF	0	0	0	0	0	0
	SR	1	2	2	1	0	6
	SC	1	0	0	1	0	2
	SE	0	1	1	0	0	2
	WR	1	0	0	2	0	3
	KRC	0	0	0	0	0	0
	METRO	0	0	0	0	0	0
	TOTAL	3	3	5	9	0	20

year	RLY	Special "A" Class	"A" Class	"B" Class	"C" Class		Total
					With telephone	Without Telephone	
1995-96	CR	0	0	0	2	0	2
	ER	0	0	0	2	0	2
	NR	0	0	0	5	0	5
	NE	0	0	0	1	0	1
	NF	0	0	0	1	0	1
	SR	0	0	0	2	0	2
	SC	0	0	0	2	0	2
	SE	0	0	1	0	0	1
	WR	0	0	0	0	0	0
	KRC	0	0	0	0	0	0
	METRO	0	0	0	0	0	0
	TOTAL	0	0	1	15	0	16

year	RLY	Special "A" Class	"A" Class	"B" Class	"C" Class		Total
					With telephone	Without Telephone	
1996-97	CR	0	0	0	3	1	4
	ER	0	2	0	1	1	4
	NR	0	0	2	2	1	5
	NE	0	0	0	1	0	1
	NF	0	0	0	0	0	0
	SR	0	0	0	1	0	1
	SC	0	0	0	2	0	2
	SE	0	1	1	0	0	2
	WR	0	0	1	1	0	2
	KRC	0	0	0	0	0	0
	METRO	0	0	0	0	0	0
	TOTAL	0	3	4	11	3	21

year	RLY	Special "A" Class	"A" Class	"B" Class	"C" Class		Total
					With telephone	Without Telephone	
1997-98	CR	0	0	0	0	0	0
	ER	0	0	0	1	0	1
	NR	0	0	0	1	2	3
	NE	1	0	1	0	0	2
	NF	0	0	2	0	0	2
	SR	0	0	0	1	0	1
	SC	0	0	1	0	0	1
	SE	0	0	3	1	0	4
	WR	0	1	1	0	0	2
	KRC	0	0	0	0	0	0
	METRO	0	0	0	0	0	0
	TOTAL	1	1	8	4	2	16

Annexure -35

State wise distribution of accidents at level crossings according to type of vehicles involved during 93-94 to 97-98

A-No. of vehicles involved in accidents at level crossings (type-wise)

B- No. of accidents taken as a percentage of the total number of accidents at all level crossings in the State

s.no.	Type of vehicle	Year	Andhra Pradesh		Arunachal Pradesh		Assam		Bihar		Delhi		Goa	
			A	B	A	B	A	B	A	B	A	B	A	B
1	Minor trucks	1993-94	2	50	0		0		0		1	100	0	
		1994-95	4	44.4	0		0		0		0		0	
		1995-96	2	28.6	0		0		0		0		0	
		1996-97	2	25	0		0		0		0		0	
		1997-98	1	20	0		0		2	33.3	0		0	
2	Passenger buses	1993-94	0		0		1	100	0		0		0	
		1994-95	1	11.11	0		0		1	33.3	0		0	
		1995-96	1	14.29	0		1	100	0		0		0	
		1996-97	2	25	0		0		1	50	0		0	
		1997-98	0		0		2	100	1	16.7	0		0	
3	Taxis, cars and	1993-94	0		0		0		0		0		0	

	jeeps	1994-95	1	11.11	0		0		0		0		0	
		1995-96	0		0		0		0		0		0	
		1996-97	1	12.5	0		0		1	50	0		0	
		1997-98	0		0		0		1	16.7	1	100	0	
4	Tractors	1993-94	1	25	0		0		1	100	0		0	
		1994-95	3	33.33	0		0		2	66.7	0		0	
		1995-96	2	28.57	0		0		0		0		0	
		1996-97	2	25	0		0		0		0		0	
		1997-98	1	20	0		0		2	33.3	0		0	
5	Tongas	1993-94	1	25	0		0		0		0		0	
		1994-95	0		0		0		0		0		0	
		1995-96	0		0		0		0		0		0	
		1996-97	1	12.5	0		0		0		0		0	
		1997-98	2	40	0		0		0		0		0	
6	Bullock cart	1993-94	0		0		0		0		0		0	
		1994-95	0		0		0		0		0		0	
		1995-96	1	14.29	0		0		0		0		0	
		1996-97	0		0		0		0		0		0	
		1997-98	0		0		0		0		0		0	
7	Others	1993-94	0		0		0		0		0		0	
		1994-95	0		0		0		0		0		0	
		1995-96	1	14.29	0		0		0		0		0	

		1996-97	0		0		0		0		0		0	
		1997-98	1	20	0		0		0		0		0	
8	Total	1993-94	4	100	0		1	100	1	100	1	100	0	
		1994-95	9	100	0		0		3	100	0		0	
		1995-96	7	100	0		1	100	0		0		0	
		1996-97	8	100	0		0		2	100	0		0	
		1997-98	5	100	0		2	100	6	100	1	100	0	

s.no.	**Type of vehicle**	**Year**	**Gujarat**		**Haryana**		**Himachal Pradesh**		**Jammu & Kashmir**		**Karnataka**	
			A	B	A	B	A	B	A	B	A	B
1	Minor trucks	1993-94	5	71.4	2	66.7	0		0		0	
		1994-95	3	42.9	0		0		0		0	
		1995-96	0		0		0		1	100	1	8.33
		1996-97	2	66.7	1	2	0		0		0	
		1997-98	2	25	1	0	0		0		0	
2	Passenger buses	1993-94	1	14.3	1		0		0		0	
		1994-95	1	14.3	0		0		0		0	
		1995-96	1	20	1	50	0		0		3	25
		1996-97	0		0		0		0		0	
		1997-98	1	12.5	1	50	0		0		0	
3	Taxis, cars and	1993-94	0		0		0		0		0	

	jeeps	1994-95	2	28.6	1	100	0		0		0	
		1995-96	0		0		0		0		1	8.33
		1996-97	1	33.3	2	40	0		0		1	16.7
		1997-98	0		0		0		0		0	
4	Tractors	1993-94	1	14.3	0		0		0		0	
		1994-95	0		0		0		0		0	
		1995-96	2	40	1	50	0		0		2	16.7
		1996-97	0		2	40	0		0		2	33.3
		1997-98	0		1	20	0		0		0	
5	Tongas	1993-94	0		0		0		0		0	
		1994-95	0		0		0		0		0	
		1995-96	0		0		0		0		0	
		1996-97	0		0		0		0		0	
		1997-98	0		0		0		0		0	
6	Bullock cart	1993-94	0		0		0		0		0	
		1994-95	0		0		0		0		1	14.3
		1995-96	0		0		0		0		0	
		1996-97	0		0		0		0		0	
		1997-98	0		0		0		0		0	
7	Others	1993-94	0		0		0		0		4	100
		1994-95	1	14.3	0		0		0		6	85.7
		1995-96	2	40	0		0		0		5	41.7

		1996-97	0		0		0		0		3	50
		1997-98	5	62.5	2	40	0		0		3	100
8	Total	1993-94	7	100	3	100	0		0		4	100
		1994-95	7	100	1	100	0		0		7	100
		1995-96	5	100	2	100	0		1	100	12	100
		1996-97	2	100	5	100	0		0		6	100
		1997-98	8	100	5	100	0		0		3	100

Contd. …

S. no.	Type of vehicle	Year	Kerala		Madhya Pradesh		Maharashtra		Orissa		Punjab		Pondicherry	
			A	B	A	B	A	B	A	B	A	B	A	B
1	Minor trucks	1993-94	0		2	28.6	1	25	1	100	1	20	0	
		1994-95	0		1	100	3	50	1	100	1	50	0	
		1995-96	0		1	25	0		0		1	20	0	
		1996-97	0		2	28.6	0		0		1	100	0	
		1997-98	0		0		0		0		0		0	
2	Passenger buses	1993-94	0		2	28.57	1	25	0		0		0	
		1994-95	0		0		0		0		1	50	0	
		1995-96	0		0		1	25	0		0		0	
		1996-97	1	33.3	1	14.29	0		1	100	0		0	
		1997-98	0		0		1	50	0		0		0	

3	Taxis, cars and jeeps	1993-94	0		1	14.29	0		0		1	20	0	
		1994-95	0		0		0		0		0		0	
		1995-96	0		0		0		0		2	40	0	
		1996-97	0		1	14.2	2	40	0		0		0	
		1997-98	0		1	100	0		3	100	1	25	0	
4	Tractors	1993-94	0		1	14.29	1	25	0		1	20	0	
		1994-95	0		0		0		0		0		0	
		1995-96	0		1	25	1	25	0		2	40	0	
		1996-97	0		2	28.6	3	60	0		0		0	
		1997-98	1	100	0		0		0		3	75	0	
5	Tongas	1993-94	0		0		0		0		0		0	
		1994-95	0		0		0		0		0		0	
		1995-96	0		0		0		0		0		0	
		1996-97	0		0		0		0		0		0	
		1997-98	0		0		0		0		0		0	
6	Bullock cart	1993-94	0		0		0		0		0		0	
		1994-95	0		1	100	1	16.67	0		0		0	
		1995-96	0		1	25	1	25	0		0		0	
		1996-97	0		0		0		0		0		0	
		1997-98	0		0		0		0		0		0	
7	Others	1993-94	1	100	1	14.29	1	25	0		2	40	0	

		1994-95	1	100	0		2	33.33	0		0		0	
		1995-96	1	100	1	25	1	25	0		0		0	
		1996-97	2	66.7	1	14.29	0		0		0		0	
		1997-98	0		0		1	50	0		0		0	
8	Total	1993-94	1	100	7	100	4	100	1	100	5	100	0	
		1994-95	1	100	1	100	6	100	1	100	2	100	0	
		1995-96	1	100	4	100	4	100	0		5	100	0	
		1996-97	3	100	7	100	5	100	1	100	1	100	0	
		1997-98	1	100	1	100	2	100	3	100	4	100	0	

s.no.	**Type of vehicle**	**Year**	**Rajasthan**		**Tamil Nadu**		**Tripura**		**Uttar Pradesh**		**West Bengal**		**Total**	
			A	B	A	B	A	B	A	B	A	B	A	B
1	Minor trucks	1993-94	0		0		0		7	33.3	1	50	23	32.4
		1994-95	2	66.7	0		0		5	35.7	0		20	27
		1995-96	1	11.1	0		0		3	25	1	33	11	15.9
		1996-97	1	20	0		0		2	14.3	1	100	12	18.2
		1997-98	0		1	11.11	0		1	10	3	100	11	16.9
2	Passenger buses	1993-94	0		1		0		2	9.52	0		9	12.7
		1994-95	0		2	10.53	0		1	7.14	0		7	9.46
		1995-96	0		0		0		1	8.33	1	33	10	14.5

		1996-97	0		0		0		2	14.3	0		8	12.1
		1997-98	0		1	11.11	0		1	10	0		8	12.3
3	Taxis, cars and jeeps	1993-94	3	75	0		0		3	14.3	1	50	9	12.7
		1994-95	0		2	10.53	0		2	14.3	0		8	10.8
		1995-96	3	33.3	1	33.33	0				0		7	10.1
		1996-97	2	40	3	60	0		3	21.4	0		17	25.8
		1997-98	0		1	11.11	0		4	40	0		12	18.5
4	Tractors	1993-94	0		0		0		7	33.3	0		13	18.3
		1994-95	1	33.3	4	21.05	0		5	35.7	0		15	20.3
		1995-96	3	33.3	0		0		6	50	0		20	29
		1996-97	1	20	1	20	0		6	42.9	0		19	28.8
		1997-98	1	50	2	22.22	0		4	40	0		15	23.1
5	Tongas	1993-94	0		0		0				0		1	1.41
		1994-95	0		0		0				0		0	
		1995-96	0		0		0				0		0	
		1996-97	0		0		0				0		1	1.52
		1997-98	0		0		0				0		2	3.08
6	Bullock cart	1993-94	0		0		0				0		0	
		1994-95	0		0		0		1	7.14	0		4	5.41
		1995-96	0		0		0				0		3	4.35
		1996-97	0		0		0				0		0	
		1997-98	0		0		0				0		0	

7	Others	1993-94	1	25	4	80	0		2	9.52	0		16	22.5
		1994-95	0		11	57.89	0				0		21	28.4
		1995-96	2	22.2	2	66.67	0		2	16.7	1	33	18	26.1
		1996-97	1	20	1	20	0		1	7.14	0		9	13.6
		1997-98	1	50	4	44.44	0				0		17	26.2
8	Total	1993-94	4	100	5	100	0		21	100	2	100	71	100
		1994-95	3	100	19	100	0		14	100	0		74	100
		1995-96	9	100	3	100	0		12	100	3	100	69	100
		1996-97	5	100	5	100	0		14	100	1	100	66	100
		1997-98	2	100	9	100	0		10	100	3	100	65	100

Annexure-36

Incidence of fires in trains on the Broad, Metre and Narrow Gauges- Railway- wise in 5- year block.

Railway		1988-89 to 1992-93			
		BG	**MG**	**NG**	**TOTAL**
CR		6	0	0	6
ER		3	0	0	3
NR		6	0	0	6
NE		0	1	0	1
NF		0	1	0	1
SR		2	0	0	2
SC		5	2	0	7
SE		2	0	0	2
WR		8	2	0	10
KRC		0	0	0	0
Metro		0	0	0	0
Total	**No.**	**32**	**6**	**0**	**38**
	Rate per MTKM	**0.013**	**0.0096**	**0**	**0.012**

Railway		**1993-94 to 1997-98**			
		BG	**MG**	**NG**	**TOTAL**
CR		8	0	0	8
ER		0	0	0	0
NR		4	0	0	4
NE		0	1	0	1
NF		1	0	0	1
SR		1	1	0	2
SC		0	0	0	0
SE		7	0	0	7
WR		0	0	0	0
KRC		4	0	0	4
Metro		0	0	0	0
Total	**No.**	**25**	**2**	**0**	**27**
	Rate per MTKM	**0.009**	**0.0046**	**0**	**0.008**

Annexure – 37

Incidence of fires in passenger and other trains on the Broad, Metre & Narrow Gauges- Railway-wise; 5-year block.

A-Cases of fires in trains

B- Incidence of fires in trains per million train kilometres

Railway		1988-89 to 1992-93											
		BROAD GAUGE			METRE GAUGE			NARROW GAUGE			COMBINED TOTAL		
		Pass.	Other	Total	Pass.	Other	Total	Pass.	Other	Total	Pass.	Other	Total
CR		6	0	6	0	0	0	0	0	0	6	0	6
ER		3	0	3	0	0	0	0	0	0	3	0	3
NR		6	0	6	0	0	0	0	0	0	6	0	6
NE		0	0	0	1	0	1	0	0	0	1	0	1
NF		0	0	0	1	0	1	0	0	0	1	0	1
SR		1	1	2	0	0	0	0	0	0	1	1	2
SC		3	2	5	2	0	2	0	0	0	5	2	7
SE		2	0	2	0	0	0	0	0	0	2	0	2
WR		6	2	8	2	0	2	0	0	0	8	2	10
Metro		0	0	0	0	0	0	0	0	0	0	0	0
KRC		0	0	0	0	0	0	0	0	0	0	0	0
Total	A	27	5	32	6	0	6	0	0	0	33	5	38
	B	0.02	0.005	0.013	0.014	0	0.01	0	0	0	0.018	0.004	0.012

Railway		1993-94 to 1997-98											
		BROAD GAUGE			METRE GAUGE			NARROW GAUGE			COMBINED TOTAL		
		Pass.	Other	Total	Pass.	Other	Total	Pass.	Other	Total	Pass.	Other	Total
CR		8	0	8	0	0	0	0	0	0	8	0	8
ER		0	0	0	0	0	0	0	0	0	0	0	0
NR		3	1	4	0	0	0	0	0	0	3	1	4
NE		0	0	0	1	0	1	0	0	0	1	0	1
NF		1	0	1	0	0	0	0	0	0	1	0	1
SR		1	0	1	1	0	1	0	0	0	2	0	2
SC		0	0	0	0	0	0	0	0	0	0	0	0
SE		7	0	7	0	0	0	0	0	0	7	0	7
WR		0	0	0	0	0	0	0	0	0	0	0	0
Metro		2	2	4	0	0	0	0	0	0	2	2	4
KRC		0	0	0	0	0	0	0	0	0	0	0	0
Total	A	22	3	25	2	0	2	0	0	0	24	3	27
	B	0.013	0.003	0.009	0.006	0	0.005	0	0	0	0.012	0.002	0.008

ANNEXURE – 38

Cause – wise analysis of fires in trains on Railway-wise during 1988-89 to 1997-98

Period		Cause	CR	ER	NR	NE	NF	SR	SC	SE	WR	METRO	KRC	ALL RLY
88-89 to 97-98	1	Carrying of Kerosene oil/Petrol	0	0	0	1	0	1	0	0	0	0	0	2
	2	Inflammable substances	0	1	0	1	0	0	0	0	0	0	0	2
	a	Explosive material/Bomb blast	0	0	0	0	0	0	0	2	1	0	0	3
	b	Acid & chemicals	1	0	1	0	0	0	0	0	2	0	0	4
	c	Gas cylinders	2	0	0	0	0	0	0	0	1	0	0	3
	d	Film etc.	0	0	0	0	0	0	0	0	0	0	0	0
	3	Miscreant activity/Sabotage	0	0	0	0	1	1	3	1	0	1	0	7
	4	Cigarette, Beedi ends thrown	1	1	5	0	0	0	2	2	0	0	0	11
	5	Hot axle/uneven loading/overloading	0	0	1	0	0	0	1	0	1	0	0	3
	6	Fire in consignment	0	0	0	0	0	0	0	1	0	0	0	1

		due to friction												
	7	Burning of Sigri by Railway Staff	0	1	0	0	0	0	0	0	0	0	0	1
	8	Electrical short circuits	0	0	2	0	0	1	0	1	2	1	0	7
	9	Manufacturing defects of electrical parts	0	0	0	0	0	0	0	0	0	1	0	1
	10	Other Electrical faults	6	0	0	0	0	0	0	0	0	1	0	9
	11	Cause could not be established	4	0	1	0	1	1	1	0	3	0	0	11
	12	Total	14	3	10	2	2	4	7	9	10	4	0	65

Annexure -39

Casualties and loss due to damage to railway properties in Fires in trains-all Gauges combined Railway – wise and 5-year block.

Railway	1998-89 to 1992-93					1993-94 to 1997-98				
	Total No. of fires in Trains	casualties			Cost of damages (Rs. In Lakhs)	Total No. of fires in Trains	casualties			Cost of damages (Rs. In Lakhs)
		Killed	Injured	Total			Killed	Injured	Total	
CR	6	16	128	144	9.98	8	0	1	1	112.32
ER	3	74	50	124	4.1	0	0	0	0	0
NR	6	0	0	0	35.77	4	0	0	0	8.92
NE	1	1	0	1	1.03	1	0	0	0	1.39
NF	1	0	0	0	0.95	1	0	0	0	0.8
SR	2	3	1	4	27.51	2	1	6	7	20.84
SC	7	49	13	62	38.18	0	0	0	0	0
SE	2	0	0	0	0.96	7	48	49	97	69.8
WR	10	25	25	50	182.3	0	0	0	0	0
Metro	0	0	0	0	0	4	0	0	0	8.8
KRC	0	0	0	0	0	0	0	0	0	0
Total	38	168	217	385	300.78	27	49	56	105	222.87

Annexure- 40

Consequential accidents on the BG, MG & NG combined due to failure of human elements for Railway-wise – in 5-year blocks

1988-89 to 1992-93	S. No.	Description	Types of accidents	CR	ER	NR	NE	NF	SR*
	1	Total number of accidents	Collisions	32	40	26	9	7	11
			Derailments	212	254	331	100	240	267
			Level crossings	24	15	58	30	5	336
			Fires	6	3	6	1	1	2
			Total*	274	312	421	140	253	313
	2	Number of accidents where cause could not be determined	Collisions	1	0	0	0	0	0
			Derailments	0	7	4	0	0	0
			Level crossings	0	0	0	0	0	0
			Fires	3	0	0	0	0	0
			Total*	4	7	4	0	0	0
	3	Number of accidents where cause was established	Collisions	31	40	26	9	7	10
			Derailments	212	247	327	100	240	177
			Level crossings	24	15	58	30	5	24
			Fires	3	3	6	1	1	2
			Total*	270	305	417	140	253	213

	4	Number of accidents due to failure of staff (Direct)	Collisions	27	39	26	9	6	10
			Derailments	158	173	39	17	137	53
			Level crossings	6	6	13	5	5	6
			Fires	0	1	4	0	0	2
			Total*	191	219	82	31	148	71
	5	Percentage (S. No. 4x 100)/ S. No. 3	Collisions	87.097	97.5	100	100	85.71	100
			Derailments	74.528	70.04	11.93	17	57.08	29.944
			Level crossings	25	40	22.41	16.67	100	25
			Fires	0	33.333	66.67	0	0	100
			Total*	70.741	71.803	19.66	22.14	58.5	33.333
	6	Number of accidents attributable to failure of material equipment or systems where staff was responsible indirectly	Collisions	4	1	0	0	1	0
			Derailments	54	74	288	83	103	124
			Level crossings	0	0	45	0	0	0
			Fires	1	0	2	0	0	0
			Total*	59	75	335	83	104	124
	7	Percentage (s. No. 6 x 100)/S. No. 3	Collisions	12.903	2.5	0	0	14.29	0
			Derailments	25.472	29.96	88.07	83	42.92	70.056
			Level crossings	0	0	77.59	0	0	0
			Fires	33.333	0	33.33	0	0	0

			Total*	21.852	24.59	80.34	59.29	41.11	58.216
	8	Number of accidents due to failure of staff (Direct and indirect)	Collisions	31	40	26	9	7	10
			Derailments	212	247	327	100	240	177
			Level crossings	6	6	58	5	5	6
			Fires	1	1	6	0	0	2
			Total*	250	294	417	114	252	195
	9	Percentage (S. No. 8x 100)/S. No. 3	Collisions	100	100	100	100	100	100
			Derailments	100	100	100	100	100	100
			Level crossings	25	40	100	16.67	100	25
			Fires	33.333	33.333	100	0	0	100
			Total*	92.593	96.393	100	81.43	96.6	91.549
	10	*All consequential accidents Collisions		274	312	421	140	253	313

1988-89 to 1992-93	S. No.	Description	Types of accidents	SC	SE*	WR	METRO	KRC	TOTAL
	1	Total number of accidents	Collisions	19	29	15	0	0	188
			Derailments	233	782	208	0	0	2627
			Level crossings	16	35	37	0	0	253
			Fires	7	2	10	0	0	38
			Total*	275	848	270	0	0	3106
	2	Number of accidents where cause could not be determined	Collisions	0	0	0	0	0	1
			Derailments	0	0	2	0	0	13
			Level crossings	0	0	0	0	0	0
			Fires	0	0	3	0	0	6
			Total*	0	0	5	0	0	20
	3	Number of accidents where cause was established	Collisions	19	0	15	0	0	157
			Derailments	233	0	206	0	0	1742
			Level crossings	2	0	37	0	0	195
			Fires	4	0	7	0	0	27
			Total*	258	0	265	0	0	2121
	4	Number of accidents due to failure of staff (Direct)	Collisions	19	0	14	0	0	150
			Derailments	160	0	15	0	0	893
			Level crossings	0	0	8	0	0	49
			Fires	1	0	5	0	0	13

			Total*	180	0	183	0	0	1105
	5	Percentage (S. No. 4x 100)/ S. No. 3	Collisions	0	0	93.33	0	0	95.54
			Derailments	68.67	0	75.73	0	0	51.26
			Level crossings	0	0	21.62	0	0	25.13
			Fires	25	0	71.43	0	0	48.15
			Total*	69.767	0	69.06	0	0	52.10
	6	Number of accidents attributable to failure of material equipment or systems where staff was responsible indirectly	Collisions	0	0	1	0	0	7
			Derailments	73	0	50	0	0	849
			Level crossings	0	0	0	0	0	45
			Fires	1	0	0	0	0	4
			Total*	74	0	51	0	0	905
	7	Percentage (s. No. 6 x 100)/S. No. 3	Collisions	0	0	6.67	0	0	4.46
			Derailments	31.33	0	24.27	0	0	48.74
			Level crossings	0	0	0	0	0	23.08
			Fires	25	0	0	0	0	14.81
			Total*	28.682	0	19.25	0	0	42.67
	8	Number of accidents due to failure of	Collisions	19	0	15	0	0	157
			Derailments	233	0	206	0	0	1742
			Level crossings	0	0	8	0	0	94

		staff (Direct and indirect)	Fires	2	0	5	0	0	17
			Total*	254	0	234	0	0	2010
	9	Percentage (S. No. 8x 100)/S. No. 3	Collisions	0	0	100	0	0	100
			Derailments	100	0	100	0	0	100
			Level crossings	2	0	21.62	0	0	48.21
			Fires	50	0	71.43	0	0	62.96
			Total*	98.45	0	88.30	0	0	94.77
	10	*All consequential accidents Collisions		275	537	270	0	0	2795

***Note:1. Details of all categories of accidents not furnished by South-Eastern Railway (848 accidents during 88-89 to 92-93) and by Southern Railway (100 accidents during 88-89 to 90-91)**

2. Bread-up for 16 accidents at level crossings not furnished by South Central Railway during 88-89 to 92-93.

Contd. …

1993-94 to 1997-98	**S. No.**	**Description**	**Types of accidents**	**CR**	**ER**	**NR**	**NE**	**NF**	**SR**
	1	Total number of accidents	Collisions	37	31	28	11	3	11
			Derailments	220	131	376	82	141	184
			Level crossings	18	10	75	42	11	73
			Fires	8	0	4	1	1	2
			Total*	283	172	483	136	156	270

	2	Number of accidents where cause could not be determined	Collisions	0	0	0	0	0	0
			Derailments	6	0	4	0	0	0
			Level crossings	0	0	0	0	0	0
			Fires	1	0	1	0	0	0
			Total*	7	0	5	0	0	0
	3	Number of accidents where cause was established	Collisions	37	31	28	11	3	11
			Derailments	214	131	372	82	141	184
			Level crossings	18	10	75	42	11	73
			Fires	7	0	3	1	1	2
			Total*	276	172	478	136	156	270
	4	Number of accidents due to failure of staff (Direct)	Collisions	33	31	28	11	3	11
			Derailments	169	98	53	9	101	30
			Level crossings	5	7	14	1	11	8
			Fires	0	0	3	0	0	0
			Total*	207	136	98	21	115	49
	5	Percentage (S. No. 4x 100)/ S. No. 3	Collisions	89.189	100	100	100	100	100
			Derailments	78.972	74.809	14.25	10.98	71.63	16.304
			Level crossings	27.778	70	18.67	2.381	100	10.959
			Fires	0	0	100	0	0	0
			Total*	75	79.07	20.5	15.44	73.72	18.148
	6	Number of accidents	Collisions	4	0	0	0	0	0
			Derailments	45	33	319	73	40	154

		attributable to failure of material equipment or systems where staff was responsible indirectly	Level crossings	0	2	61	1	0	0
			Fires	5	0	0	0	0	1
			Total*	54	35	380	74	40	155
	7	Percentage (s. No. 6 x 100)/S. No. 3	Collisions	10.811	0	0	0	0	0
			Derailments	21.028	25.191	85.75	89.02	28.37	83.696
			Level crossings	0	20	81.33	2.381	0	0
			Fires	71.429	0	0	0	0	50
			Total*	19.565	20.349	79.5	54.41	25.64	57.407
	8	Number of accidents due to failure of staff (Direct and indirect)	Collisions	37	31	28	11	3	11
			Derailments	214	131	372	82	141	184
			Level crossings	4	9	75	2	11	8
			Fires	5	0	3	0	0	1
			Total*	260	171	478	95	155	204
	9	Percentage (S. No. 8x 100)/S. No. 3	Collisions	100	100	100	100	100	100
			Derailments	100	100	100	100	100	100
			Level crossings	22.222	90	100	4.762	100	10.959
			Fires	71.429	0	100	0	0	50
			Total*	94.203	99.419	100	69.85	99.36	75.556

	10	*All consequential accidents Collisions	283	172	483	136	156	270

1993-94 to 1997-98	S.No.	Description	Types of accidents	SC	SE	WR	METRO	KRC	TOTAL
	1	Total number of accidents	Collisions	11	24	24	0	0	180
			Derailments	174	525	172	2	6	2013
			Level crossings	42	25	49	0	0	345
			Fires	0	7	0	4	0	27
			Total*	227	581	245	6	6	2565
	2	Number of accidents where cause could not be determined	Collisions	0	0	0	0	0	0
			Derailments	0	15	5	0	0	30
			Level crossings	0	0	0	0	0	0
			Fires	0	0	0	0	0	2
			Total*	0	15	5	0	0	32
	3	Number of accidents where cause was established	Collisions	11	24	24	0	0	180
			Derailments	174	510	167	2	6	1983
			Level crossings	42	25	49	0	0	345
			Fires	0	7	0	4	0	25
			Total*	227	566	240	6	6	2533
	4	Number of	Collisions	11	23	24	0	0	175

		accidents due to failure of staff (Direct)	Derailments	123	383	135	0	0	1101
			Level crossings	0	9	7	0	0	62
			Fires	0	0	0	0	0	3
			Total*	134	415	166	0	0	1341
	5	Percentage (S. No. 4x 100)/ S. No. 3	Collisions	0	95.833	100	0	0	97.22
			Derailments	70.69	75.098	80.84	0	0	55.52
			Level crossings	0	36	14.29	0	0	17.97
			Fires	0	0	0	0	0	12
			Total*	59.031	73.322	69.17	0	0	52.94
	6	Number of accidents attributable to failure of material equipment or systems where staff was responsible indirectly	Collisions	0	1	0	0	0	5
			Derailments	51	127	32	2	6	882
			Level crossings	0	0	0	0	0	64
			Fires	0	2	0	4	0	12
			Total*	51	130	32	6	6	963
	7	Percentage (s. No. 6 x 100)/S. No. 3	Collisions	0	4.1667	0	0	0	2.78
			Derailments	29.31	24.902	019.16 17	100	100	44.48
			Level crossings	0	0	0	0	0	18.55
			Fires	0	28.571	0	100	0	48

			Total*	22.467	22.968	13.33	100	100	38.02
	8	Number of accidents due to failure of staff (Direct and indirect)	Collisions	11	24	24	0	0	180
			Derailments	174	510	167	2	6	1983
			Level crossings	0	9	7	0	0	126
			Fires	0	3	0	4	0	15
			Total*	185	546	198	6	6	2304
	9	Percentage (S. No. 8x 100)/S. No. 3	Collisions	0	100	100	0	0	100
			Derailments	100	100	100	100	100	100
			Level crossings	0	36	14.29	0	0	36.52
			Fires	0	42.857	0	100	0	60
			Total*	81.498	96.466	82.5	100	100	90.96
	10	*All consequential accidents Collisions		227	581	245	6	6	2565

Annexure – 41

Punishment awarded to staff held responsible for train accidents-Category-wise Railway-wise in 5- Year block.

					Number of staff punished with major penalties					
1988-89 to 1992-93		**Category**	**Total Number of consequential train accidents**	**Number of staff held responsible**	**Dismissal/removal from service**	**%age to total punishments**	**Compulsory retirement**	**%age to total punishments**	**Reduction in rank/grade**	**%age to total punishments**
	CR	Collisions	32	72	20	24.4	10	12.2	18	22.0
		Derailments	212	243	12	5.0	5	2.1	65	27.0
		Level crossings	24	9	2	22.2	1	11.1	5	55.6
		Fires	6	0	0	0.0	0	0	0	0
		Total*	274	324	34	10.5	16	4.9	88	27.2
	ER	Collisions	40	102	21	20.6	13	12.7	26	25.5
		Derailments	254	251	11	3.5	8	2.6	48	15.4
		Level crossings	15	13	2	15.4	0	0	4	30.8

		Fires	3	1	0	0	0	0	1	100
		Total*	312	417	34	8.2	21	5.0	79	18.9
	NR	Collisions	26	65	24	38.7	2	3.2	18	29.0
		Derailments	331	591	14	3.1	8	1.8	87	19.6
		Level crossings	58	38	5	13.2	1	2.6	13	34.2
		Fires	6	9	0	0	0	0	1	12.5
		Total*	421	703	43	7.8	11	2.0	119	21.5
	NE	Collisions	9	18	5	27.8	0	0	12	66.7
		Derailments	100	139	0	0	0	0	9	6.5
		Level crossings	30	7	2	28.6	1	14.3	0	0
		Fires	1	0	0	0	0	0	0	0.0
		Total*	140	166	7	4.3	1	0.6	21	12.8
	NF	Collisions	7	17	4	23.5	2	11.8	5	29.4
		Derailments	240	247	1	0.4	0	0	7	2.8
		Level crossings	5	0	0	0	0	0	0	0
		Fires	1	0	0	0.0	0	0	0	0
		Total*	253	264	5	1.9	2	0.8	12	4.5
	SR	Collisions	11	26	3	18.8	3	18.8	8	50
		Derailments	267	325	1	0.3	2	0.7	35	12.1
		Level crossings	33	12	1	10	0	0	2	20
		Fires	2	8	0	0	0	0	2	100
		Total*	313	371	5	1.6	5	1.6	47	14.9

	SC	Collisions	19	42	14	36.8	2	5.3	8	21.1
		Derailments	233	244	14	5.7	4	1.6	55	22.5
		Level crossings	16	0	0	0	0	0	0	0
		Fires	7	0	0	0	0	0	0	0
		Total*	275	286	28	9.9	6	2.1	63	22.3
	SE	Collisions	29	60	15	25	0	0	16	26.7
		Derailments	782	529	2	0.4	3	0.6	37	7.0
		Level crossings	35	5	0	0	0	0	4	80
		Fires	2	4	0	0	0	0	0	0
		Total*	848	598	17	2.8	3	0.5	57	9.5
	WR	Collisions	15	32	7	21.9	4	12.5	9	28.1
		Derailments	208	245	1	0.4	7	2.9	27	11.0
		Level crossings	37	12	4	33.3	0	0	4	33.3
		Fires	10	4	0	0	0	0	0	0
		Total*	270	293	12	4.1	11	3.8	40	13.7
	Metro	Collisions	0	0	0	0	0	0	0	0
		Derailments	0	0	0	0	0	0	0	0
		Level crossings	0	0	0	0	0	0	0	0
		Fires	0	0	0	0	0	0	0	0
		Total*	0	0	0	0	0	0	0	0
	KRC	Collisions	0	0	0	0	0	0	0	0
		Derailments	0	0	0	0	0	0	0	0
		Level crossings	0	0	0	0	0	0	0	0

		Fires	0	0	0	0	0	0	0	0
		Total*	0	0	0	0	0	0	0	0
	Total	Collisions	188	434	113	26.5	36	8.4	120	28.1
		Derailments	2627	2814	56	2.1	37	1.4	370	13.7
		Level crossings	253	96	16	17.0	3	3.2	32	34.0
		Fires	38	26	0	0	0	0	4	21.1
		Total*	3106	3422	185	5.8	76	2.4	526	16.4

			Number of staff punished with major penalties		**Number of staff punished with minor penalties viz. W/H Pass, PTO WTI/ WIP etc.**	**%age to total punishments**	**Grand total of major + minor penalties**
1988-89 to 1992-93		**Category**	**Total major penalties**	**%age to total punishments**			
	CR	Collisions	48	58.5	24	29.3	82
		Derailments	82	34.0	161	66.8	241
		Level crossings	8	88.9	1	11.1	9
		Fires	0	0	0	0	0
		Total*	138	42.6	186	57.4	324
	ER	Collisions	60	58.8	42	41.2	102
		Derailments	67	21.5	244	78.5	311
		Level crossings	6	46.2	7	53.8	13

		Fires	1	100	0	0	1
		Total*	134	32.1	293	70.3	417
	NR	Collisions	44	71.0	18	29.0	62
		Derailments	109	24.5	336	75.5	445
		Level crossings	19	50	19	50	38
		Fires	1	12.5	7	87.5	8
		Total*	173	31.3	380	68.7	553
	NE	Collisions	17	94.4	1	5.6	18
		Derailments	9	6.5	130	93.5	139
		Level crossings	3	42.9	4	57.1	7
		Fires	0	0	0	0	0
		Total*	29	17.7	135	82.3	164
	NF	Collisions	11	64.7	6	35.3	17
		Derailments	8	3.2	239	96.8	247
		Level crossings	0	0	0	0	0
		Fires	0	0	0	0	0
		Total*	19	7.2	245	92.8	264
	SR	Collisions	14	87.5	2	12.5	16
		Derailments	38	13.1	250	86.2	290
		Level crossings	3	30	7	70	10
		Fires	2	100	0	0	2
		Total*	57	18.0	259	82.0	316

	SC	Collisions	24	63.2	14	36.8	38
		Derailments	73	29.9	171	70.1	244
		Level crossings	0	0	0	0	0
		Fires	0	0	0	0	0
		Total*	97	34.4	185	65.6	282
	SE	Collisions	34	56.7	26	43.3	60
		Derailments	42	7.9	487	92.1	529
		Level crossings	1	20	4	80	5
		Fires	0	0	4	100	4
		Total*	77	12.9	521	87.1	598
	WR	Collisions	20	62.5	12	37.5	32
		Derailments	35	14.3	210	85.7	245
		Level crossings	8	66.7	4	33.3	12
		Fires	0	0	4	100	4
		Total*	63	21.5	230	78.5	293
	Metro	Collisions	0	0	0	0	0
		Derailments	0	0	0	0	0
		Level crossings	0	0	0	0	0
		Fires	0	0	0	0	0
		Total*	0	0	0	0	0
	KRC	Collisions	0	0	0	0	0
		Derailments	0	0	0	0	0
		Level crossings	0	0	0	0	0

		Fires	0	0	0	0	0
		Total*	0	0	0	0	0
	Total	Collisions	272	63.7002	145	34.0	427
		Derailments	463	17.2	2228	82.8	2691
		Level crossings	48	51.1	46	48.9	94
		Fires	4	21.1	15	78.9	19
		Total*	787	24.5	2434	75.8	3211

Contd. ….

Annexure – 41 (Contd.)

					Number of staff punished with major penalties					
1993-94 to 1997-98		**Category**	**Total Number of consequential train accidents**	**Number of staff held responsible**	**Dismissal/removal from service**	**%age to total punishments**	**Compulsory retirement**	**%age to total punishments**	**Reduction in rank/grade**	**%age to total punishments**
	CR	Collisions	37	71	15	21.7	9	13.0	27	39.1
		Derailments	220	265	4	1.7	6	2.5	80	33.6
		Level crossings	18	8	3	37.5	0	0.0	3	37.5

		Fires	8	1	0	0.0	0	0	0	0
		Total*	283	372	26	7.6	15	4.4	122	35.6
	ER	Collisions	31	81	23	28.4	11	13.6	27	33.3
		Derailments	131	154	2	1.3	5	3.2	50	32.5
		Level crossings	10	11	4	36.4	1	9.09091	3	27.3
		Fires	0	0	0	0	0	0	0	0
		Total*	172	246	29	11.8	17	6.9	80	32.5
	NR	Collisions	28	73	27	41.5	3	4.6	15	23.1
		Derailments	376	577	19	4.7	7	1.7	72	17.7
		Level crossings	75	24	8	27.6	3	10.3	3	10.3
		Fires	4	2	0	0	0	0	0	0
		Total*	483	676	54	10.8	13	2.6	90	17.9
	NE	Collisions	11	43	11	25.6	1	2.32558	10	23.3
		Derailments	82	159	13	8.783784	4	2.7027	13	8.8
		Level crossings	42	1	1	100.0	0	0.0	0	0
		Fires	1	0	0	0	0	0	0	0.0
		Total*	136	203	25	13.2	5	2.6	23	12.1
	NF	Collisions	3	7	0	0.0	0	0.0	3	42.9
		Derailments	141	186	0	0.0	7	4.32099	21	13.0
		Level crossings	11	5	1	50	0	0	0	0
		Fires	1	0	0	0.0	0	0	0	0

		Total*	156	198	1	0.6	7	4.1	24	14.1
	SR	Collisions	11	23	3	15.8	1	5.3	10	50.632
		Derailments	184	282	5	2.0	2	0.8	41	16.4
		Level crossings	73	15	4	26.66667	1	6.66667	6	40
		Fires	2	0	0	0	0	0	0	0
		Total*	270	320	12	4.2	4	1.4	57	20.1
	SC	Collisions	11	26	6	24.0	1	4.0	11	44.0
		Derailments	174	191	15	7.9	0	0.0	55	28.8
		Level crossings	42	12	5	45.45455	0	0	1	9.0909
		Fires	0	0	0	0	0	0	0	0
		Total*	227	229	26	11.5	1	0.4	67	29.5
	SE	Collisions	24	63	25	39.68254	5	7.93651	23	36.5
		Derailments	525	650	30	4.6	4	0.6	165	25.4
		Level crossings	25	10	6	85.71429	1	14.2857	0	0
		Fires	7	0	0	0	0	0	0	0
		Total*	581	723	61	8.5	10	1.4	188	26.1
	WR	Collisions	24	71	9	16.7	6	11.1	11	20.4
		Derailments	172	319	5	1.6	5	1.6	31	9.9
		Level crossings	49	18	0	0.0	1	6.25	2	12.5
		Fires	0	0	0	0	0	0	0	0

		Total*	245	408	14	3.7	12	3.1	44	11.5
	Metro	Collisions	0	0	0	0	0	0	0	0
		Derailments	2	0	0	0	0	0	0	0
		Level crossings	0	0	0	0	0	0	0	0
		Fires	4	0	0	0	0	0	0	0
		Total*	6	0	0	0	0	0	0	0
	KRC	Collisions	0	0	0	0	0	0	0	0
		Derailments	6	0	0	0	0	0	0	0
		Level crossings	0	0	0	0	0	0	0	0
		Fires	0	0	0	0	0	0	0	0
		Total*	6	0	0	0	0	0	0	0
	Total	Collisions	180	458	119	27.9	37	8.7	137	32.2
		Derailments	2013	2783	93	3.7	40	1.6	528	21.0
		Level crossings	345	104	32	32.0	7	7.0	18	18.0
		Fires	27	3	0	.	0	.	0	0.0
		Total*	2565	3375	248	8.1	84	2.7	695	22.7

			Number of staff punished with major penalties		Number of staff punished with minor penalties viz. W/H Pass, PTO WTI/ WIP etc.	%age to total punishments	Grand total of major + minor penalties
1988-89 to 1992-93		**Category**	**Total major penalties**	**%age to total punishments**			
	CR	Collisions	51	73.9	18	26.1	69
		Derailments	90	37.8	148	62.2	238
		Level crossings	6	75.0	2	25.0	8
		Fires	0	0	1	100	1
		Total*	163	47.5	180	52.5	343
	ER	Collisions	61	75.3	20	24.7	81
		Derailments	57	37.0	97	63.0	154
		Level crossings	8	72.7	3	27.3	11
		Fires	0	0	0	0	0
		Total*	126	51.2	120	48.8	246
	NR	Collisions	45	69.2	20	30.8	65
		Derailments	98	24.1	309	75.9	407
		Level crossings	19	65.5172	10	34.483	29
		Fires	0	0	1	100	1
		Total*	162	32.3	340	67.7	502

	NE	Collisions	22	51.2	21	48.8	43
		Derailments	30	20.3	118	79.7	148
		Level crossings	1	100.0	0	0.0	1
		Fires	0	0	0	0	0
		Total*	53	27.9	139	73.2	190
	NF	Collisions	3	42.9	4	57.1	7
		Derailments	28	17.3	134	82.7	162
		Level crossings	1	50	1	50	2
		Fires	0	0	0	0	0
		Total*	32	18.8	139	81.8	170
	SR	Collisions	14	73.6842	5	26.316	19
		Derailments	48	19.2	202	80.8	250
		Level crossings	11	73.3333	4	26.667	15
		Fires	0	0	0	0	0
		Total*	73	25.7	211	74.3	284
	SC	Collisions	18	72.0	7	28.0	25
		Derailments	70	36.6	121	63.4	191
		Level crossings	5	45.4545	6	54.545	11
		Fires	0	0	0	0	0
		Total*	93	41.0	134	59.0	227
	SE	Collisions	53	84.1	10	15.9	63
		Derailments	199	30.6	451	69.4	650

		Level crossings	7	100	0	0	7
		Fires	0	0	0	0	0
		Total*	259	36.0	461	64.0	720
	WR	Collisions	26	48.1481	28	51.852	54
		Derailments	41	13.1	271	86.9	312
		Level crossings	3	18.8	13	81.3	16
		Fires	0	0	0	0	0
		Total*	70	18.3	312	81.7	382
	Metro	Collisions	0	0	0	0	0
		Derailments	0	0	0	0	0
		Level crossings	0	0	0	0	0
		Fires	0	0	0	0	0
		Total*	0	0	0	0	0
	KRC	Collisions	0	0	0	0	0
		Derailments	0	0	0	0	0
		Level crossings	0	0	0	0	0
		Fires	0	0	0	0	0
		Total*	0	0	0	0.0	0
	Total	Collisions	293	68.7793	133	31.2	426
		Derailments	661	26.3	1851	73.7	2512
		Level crossings	61	61.0	39	39.0	100
		Fires	0	0.0	2	100.0	2
		Total*	1031	33.6	2036	66.4	3054

Annexure – 42

Total number of casualties in all categories of train accidents for the period 1988-89 to 1997-98-Railway -wise in five-year blocks.

P= Passengers R=Railway staff O= Others T= Total

Period	Railway	Total number of train accidents (all categories)	CASUALTIES											
88-89 to 92-93			KILLED				INJURED				GRAND TOTAL			
			P	R	O	T	P	R	O	T	P	R	O	T
	CR	274	108	27	51	186	580	64	99	743	688	91	150	929
	ER	312	169	16	26	211	323	78	44	445	492	94	70	656
	NR	421	68	13	125	206	289	51	284	624	357	64	409	830
	NE	140	4	4	50	58	120	46	78	244	124	50	128	302
	NF	253	18	5	30	53	194	34	46	274	212	39	76	327
	SR	313	136	9	44	189	340	64	134	538	476	73	178	727
	SC	275	122	24	26	172	513	93	55	661	635	117	227	979
	SE	848	69	15	74	158	194	94	120	408	263	109	194	566
	WR	270	4	8	95	107	138	40	369	547	142	48	464	654
	METRO	0	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	**3106**	**698**	**121**	**521**	**1340**	**2691**	**564**	**1229**	**4484**	**3389**	**685**	**1750**	**5824**

Period	Railway	Total number of train accidents (all categories)	CASUALTIES											
			KILLED				INJURED				GRAND TOTAL			
93-94 to 97-98			P	R	O	T	P	R	O	T	P	R	O	T
	CR	283	33	19	74	126	340	71	150	561	373	90	224	687
	ER	172	55	17	28	100	269	54	42	365	324	71	70	465
	NR	483	368	18	226	612	412	29	196	637	780	47	422	1249
	NE	136	99	16	140	255	355	71	64	490	454	87	204	745
	NF	156	42	4	30	76	100	23	102	225	142	27	132	301
	SR	270	77	8	146	231	185	9	145	339	262	17	291	570
	SC	227	6	4	190	200	161	19	180	360	167	23	370	560
	SE	581	150	22	58	230	513	38	145	696	663	60	203	926
	WR	245	13	13	94	120	257	87	191	535	270	100	285	655
	METRO	6	0	0	0	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	7	4	0	11	7	4	0	11
	TOTAL	**2559**	**843**	**121**	**986**	**1950**	**2599**	**405**	**1215**	**4219**	**3442**	**526**	**22.01**	**6169**

Annexure – 43

Analysis of indicative accidents-Railway-wise, Gauge-wise, year-wise during 1993-94 to 1997-98

year	Category	CR			ER			NR		
		BG	MG	NG	BG	MG	NG	BG	MG	NG
93-94	Averted Collision	0	0	0	0	0	0	0	0	0
	Breach of Block Rules	0	0	0	0	0	0	0	0	0
	Passing Signals at Danger	3	0	0	0	0	0	0	0	0
	Total	3	0	0	0	0	0	0	0	0
94-95	Averted Collision	1	0	0	0	0	0	0	0	0
	Breach of Block Rules	0	0	0	0	0	0	0	0	0
	Passing Signals at Danger	0	0	0	0	0	0	0	0	0
	Total	1	0	0	0	0	0	0	0	0
95-96	Averted Collision	0	0	0	0	0	0	0	0	0

	Breach of Block Rules	0	0	0	0	0	0	0	0	0
	Passing Signals at Danger	5	0	0	5	0	0	0	0	0
	Total	5	0	0	5	0	0	0	0	0
96-97	Averted Collision	0	0	0	0	0	0	0	0	0
	Breach of Block Rules	0	0	0	0	0	0	0	0	0
	Passing Signals at Danger	10	0	0	0	0	0	0	0	0
	Total	10	0	0	0	0	0	0	0	0
97-98	Averted Collision	1	0	0	1	0	0	0	0	0
	Breach of Block Rules	0	0	0	0	0	0	0	0	0
	Passing Signals at Danger	8	0	0	0	0	0	0	0	0
	Total	9	0	0	1	0	0	0	0	0

year	Category	NE			NF			SR		
		BG	MG	NG	BG	MG	NG	BG	MG	NG
93-94	Averted Collision	0	0	0	0	1	0	1	1	0
	Breach of Block Rules	0	1	0	0	0	0	0	1	0
	Passing Signals at Danger	0	0	0	0	0	0	6	0	0
	Total	0	1	0	0	1	0	7	2	0
94-95	Averted Collision	0	0	0	0	0	0	1	0	0
	Breach of Block Rules	0	0	0	0	0	0	0	0	0
	Passing Signals at Danger	1	0	0	0	0	0	4	1	0
	Total	1	0	0	0	0	0	5	1	0
95-96	Averted Collision	0	0	0	0	0	0	2	2	0
	Breach of Block Rules	0	0	0	0	0	0	1	1	0
	Passing	0	0	0	0	0	0	9	1	0

	Signals at Danger									
	Total	0	0	0	0	0	0	12	4	0
96-97	Averted Collision	0	0	0	0	0	0	3	1	0
	Breach of Block Rules	0	0	0	0	1	0	0	0	0
	Passing Signals at Danger	0	0	0	0	0	0	6	2	0
	Total	0	0	0	0	1	0	9	3	0
97-98	Averted Collision	0	0	0	0	0	0	0	0	0
	Breach of Block Rules	0	0	0	0	0	0	1	0	0
	Passing Signals at Danger	0	0	0	0	0	0	4	0	0
	Total	0	0	0	0	0	0	5	0	0

year	Category	SC			SE			WR		
		BG	MG	NG	BG	MG	NG	BG	MG	NG
93-94	Averted Collision	0	0	0	0	0	0	0	0	0
	Breach of Block Rules	0	0	0	0	0	0	0	0	0
	Passing Signals at Danger	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0
94-95	Averted Collision	0	0	0	0	0	0	0	0	0
	Breach of Block Rules	0	0	0	0	0	0	0	0	0
	Passing Signals at Danger	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0
95-96	Averted Collision	1	1	0	0	0	0	0	0	0
	Breach of Block Rules	5	0	0	0	0	0	0	0	0
	Passing	0	0	0	0	0	0	0	0	0

	Signals at Danger									
	Total	6	1	0	0	0	0	0	0	0
96-97	Averted Collision	0	0	0	0	0	0	0	0	0
	Breach of Block Rules	2	0	0	0	0	0	0	0	0
	Passing Signals at Danger	0	0	0	0	0	0	0	0	0
	Total	2	0	0	0	0	0	0	0	0
97-98	Averted Collision	0	0	0	0	0	0	0	0	0
	Breach of Block Rules	0	0	0	0	0	0	0	0	0
	Passing Signals at Danger	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0

year	Category	METRO			KRC			TOTAL		
		BG	MG	NG	BG	MG	NG	BG	MG	NG
93-94	Averted Collision	0	0	0	0	0	0	1	2	0
	Breach of Block Rules	0	0	0	0	0	0	0	2	0
	Passing Signals at Danger	0	0	0	0	0	0	9	0	0
	Total	0	0	0	0	0	0	10	4	0
94-95	Averted Collision	0	0	0	0	0	0	2	0	0
	Breach of Block Rules	0	0	0	0	0	0	0	0	0
	Passing Signals at Danger	0	0	0	0	0	0	5	1	0
	Total	0	0	0	0	0	0	7	1	0
95-96	Averted Collision	0	0	0	0	0	0	3	3	0
	Breach of Block Rules	0	0	0	0	0	0	6	1	0
	Passing	0	0	0	0	0	0	19	1	0

	Signals at Danger									
	Total	0	0	0	0	0	0	28	5	0
96-97	Averted Collision	0	0	0	0	0	0	3	1	0
	Breach of Block Rules	0	0	0	0	0	0	22	1	0
	Passing Signals at Danger	0	0	0	0	0	0	16	2	0
	Total	0	0	0	0	0	0	21	4	0
97-98	Averted Collision	0	0	0	0	0	0	2	0	0
	Breach of Block Rules	0	0	0	0	0	0	1	0	0
	Passing Signals at Danger	0	0	0	0	0	0	12	0	0
	Total	0	0	0	0	0	0	15	0	0

Annexure-44

Incidence of longer hours on duty of Driers 'C' during 1993-94 to 1997-98- Railway-wise, Year-wise

Year	Rly.	Total Number of trips by Driver's 'C'	Number of trips between 10-12 hrs overall duty	Number of trips between 12 -14hrs overall duty	Number of trips between 14-16 hrs overall duty	Number of trips over 16 hrs overall duty
1993-94	CR	140873	11002	6687	2240	0
	ER	163449	160681	2449	319	0
	NR	272158	257115	8102	3768	3173
	NE	48156	4936	2914	1456	486
	NF	59371	6079	1911	1890	0
	SR	122009	13539	4882	9268	0
	SC	240653	33932	16955	50818	0
	SE	314711	47072	19841	35593	17797
	WR	172849	20871	16270	13025	1762
	METRO	0	0	0	0	0
	KRC	0	0	0	0	0
	TOTAL	1534229	555227	80011	118377	23218

Year	Rly.	Total Number of trips by Drivers 'C'	Number of trips between 10-12 hrs overall duty	Number of trips between 12 -14hrs overall duty	Number of trips between 14-16 hrs overall duty	Number of trips over 16 hrs overall duty
1994-95	CR	133536	12660	7098	3052	0
	ER	162669	160384	2247	38	0
	NR	266491	252971	6729	3436	3355
	NE	33870	3318	1524	762	254
	NF	48223	4870	1540	1436	0
	SR	104133	17821	5407	8890	0
	SC	271840	37636	20472	51656	0
	SE	319594	49311	22658	41961	20980
	WR	169712	18587	17711	11831	1375
	METRO	0	0	0	0	0
	KRC	0	0	0	0	0
	TOTAL	1510068	557558	85386	123062	25964

Year	Rly.	Total Number of trips by Drivers 'C'	Number of trips between 10-12 hrs overall duty	Number of trips between 12 -14hrs overall duty	Number of trips between 14-16 hrs overall duty	Number of trips over 16 hrs overall duty
1995-96	CR	125518	13555	8222	4020	0
	ER	174864	169938	4926	0	0
	NR	260991	247971	5906	3415	3699
	NE	35850	3242	2539	1270	423
	NF	44523	6264	2311	2731	0
	SR	107086	17112	7173	11593	0
	SC	266431	35216	20209	42809	0
	SE	341411	58390	26265	47995	24318
	WR	177111	19652	18474	11813	1142
	METRO	0	0	0	0	0
	KRC	0	0	0	0	0
	TOTAL	1533785	571340	96025	125646	29582

Year	Rly.	Total Number of trips by Drivers 'C'	Number of trips between 10-12 hrs overall duty	Number of trips between 12 -14hrs overall duty	Number of trips between 14-16 hrs overall duty	Number of trips over 16 hrs overall duty
1996-97	CR	120536	12292	7626	3756	0
	ER	163425	154729	6176	2520	0
	NR	270511	256571	7281	3623	3036
	NE	39389	3166	2778	1389	463
	NF	45178	8627	3739	2547	0
	SR	110509	16002	8253	16543	0
	SC	231813	31159	14480	36516	0
	SE	350141	59263	24696	48209	24104
	WR	182645	24702	21058	11479	507
	METRO	0	0	0	0	0
	KRC	0	0	0	0	0
	TOTAL	1514147	566511	96087	126582	28110

Year	Rly.	Total Number of trips by Drivers 'C'	Number of trips between 10-12 hrs overall duty	Number of trips between 12 -14hrs overall duty	Number of trips between 14-16 hrs overall duty	Number of trips over 16 hrs overall duty
1997-98	CR	118288	15125	6483	2271	0
	ER	160345	149952	6837	3556	0
	NR	281139	261029	11000	4720	4390
	NE	22637	2478	2289	1145	381
	NF	46104	10382	3037	1742	0
	SR	108001	16376	6970	17521	0
	SC	216585	26409	11652	26002	0
	SE	353703	58644	26391	47345	23673
	WR	168929	23919	16493	9745	302
	METRO	0	0	0	0	0
	KRC	0	0	0	0	0
	TOTAL	1475731	564314	91152	114047	28746

Annexure-45

Delay in finalisation of Inquiries into train Accidents, Railway-wise, year wise during 1993-94 to 1997-98

Year	Rly.	Total no. of Accidents	No. of inquiries held			No. of cases in which inquiry has been completed including award of punishment within D+90 days	No. of staff held responsible	No. of staff finally awarded punishment	No. of inquiries pending finalisation beyond D+120	Oldest pending Inquiry
			By CRS	By Deptt.	Total					
1993-94	CR	51	3	48	51	38	49	49	5	7/10/93
	ER	47	4	43	47	6	72	72	0	8/9/92
	NR	147	1	146	147	37	196	171	40	0
	NE	35	2	33	35	35	53	53	0	0
	NF	45	0	45	45	15	47	39	4	0
	SR	50	4	46	50	6	58	58	0	0
	SC	56	1	55	56	31	61	61	0	0
	SE	182	2	180	182	175	264	264	0	0
	WR	61	6	55	61	1	112	112	0	0
	METRO	0	0	0	0	0	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	TOTAL	674	23	651	674	344	912	879	49	0

Year	Rly.	Total no. of Accidents	No. of inquiries held			No. of cases in which inquiry has been completed including award of punishment within D+90 days	No. of staff held responsible	No. of staff finally awarded punishment	No. of inquiries pending finalisation beyond D+120	Oldest pending Inquiry
			By CRS	By Deptt.	Total					
1994-95	CR	56	8	48	56	40	72	72	15	31/5/94
	ER	35	1	34	35	2	47	47	0	0
	NR	124	3	121	124	15	175	135	45	22/5/93
	NE	28	5	23	28	28	46	46	0	0
	NF	50	3	47	50	4	55	43	10	0
	SR	62	4	58	62	3	57	57	0	0
	SC	50	6	44	50	33	44	43	0	0
	SE	144	3	141	144	105	202	202	0	0
	WR	54	3	51	54	2	89	89	0	0
	METRO	1	1	0	1	1	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	TOTAL	604	37	567	604	233	787	734	70	0

Year	Rly.	Total no. of Accidents	No. of inquiries held			No. of cases in which inquiry has been completed including award of punishment within D+90 days	No. of staff held responsible	No. of staff finally awarded punishment	No. of inquiries pending finalisation beyond D+120	Oldest pending Inquiry
			By CRS	By Deptt.	Total					
1995-96	CR	54	5	49	54	39	59	59	20	30/10/95
	ER	32	2	30	32	0	44	44	0	0
	NR	69	4	65	69	17	94	74	41	22/8/93
	NE	28	3	25	28	28	53	53	0	0
	NF	23	0	23	23	9	28	25	3	0
	SR	52	1	51	52	5	60	60	0	0
	SC	41	3	38	41	25	39	39	0	0
	SE	95	1	94	95	84	96	96	0	0
	WR	44	1	43	44	1	64	58	0	0
	METRO	2	0	2	2	2	0	0	0	0
	KRC	0	0	0	0	0	0	0	0	0
	TOTAL	440	20	420	440	210	537	508	64	0

Year	Rly.	Total no. of Accidents	No. of inquiries held			No. of cases in which inquiry has been completed including award of punishment within D+90 days	No. of staff held responsible	No. of staff finally awarded punishment	No. of inquiries pending finalisation beyond D+120	Oldest pending Inquiry
			By CRS	By Deptt.	Total					
1996-97	CR	57	10	47	57	83	83	83	1	0
	ER	31	3	28	31	0	49	49	0	0
	NR	85	5	80	85	10	130	90	45	11/12/95
	NE	21	2	19	21	21	22	20	0	0
	NF	18	2	16	18	4	36	26	6	0
	SR	40	0	40	40	1	42	42	0	0
	SC	42	0	42	42	32	44	44	0	0
	SE	83	4	79	83	47	62	62	0	0
	WR	44	0	44	44	2	72	67	0	23/5/96
	METRO	2	0	2	2	2	0	0	0	0
	KRC	3	026	3	3	3	0	0	0	0
	TOTAL	426		400	426	205	540	483	52	0

Year	Rly.	Total no. of Accidents	No. of inquiries held			No. of cases in which inquiry has been completed including award of punishment within D+90 days	No. of staff held responsible	No. of staff finally awarded punishment	No. of inquiries pending finalisation beyond D+120	Oldest pending Inquiry
			By CRS	By Deptt.	Total					
1997-98	CR	65	9	56	65	64	82	82	22	5/5/97
	ER	27	3	24	27	0	55	55	0	0
	NR	58	4	54	58	11	69	32	22	6/4/95
	NE	24	5	19	24	24	35	21	0	0
	NF	20	0	20	20	7	32	12	10	0
	SR	66	2	64	66	1	103	86	11	21/10/97
	SC	37	0	37	37	28	41	41	0	0
	SE	77	2	75	77	57	82	82	1	1
	WR	42	5	37	42	2	83	56	0	23/5/96
	METRO	1	0	1	1	1	0	0	0	0
	KRC	3	0	3	3	3	0	0	0	0
	TOTAL	420	30	390	420	198	582	467	66	0

Year	Rly.	Total no. of Accidents	No. of inquiries held			No. of cases in which inquiry has been completed including award of punishment within D+90 days	No. of staff held responsible	No. of staff finally awarded punishment	No. of inquiries pending finalisation beyond D+120	Oldest pending Inquiry
			By CRS	By Deptt.	Total					
1993-94 to 97-98	CR	283	35	248	283	264	345	345	63	
	ER	172	13	159	172	8	267	267	0	
	NR	483	17	466	483	90	664	502	193	
	NE	136	17	119	136	136	209	193	0	
	NF	156	5	151	156	39	198	145	33	
	SR	270	11	259	270	16	320	303	11	
	SC	226	10	216	226	149	229	228	0	
	SE	581	12	569	581	468	706	706	1	
	WR	245	15	230	245	8	420	382	0	
	METRO	6	1	5	6	6	0	0	0	
	KRC	6	0	6	6	6	0	0	0	
	TOTAL	2564	136	2428	2564	1190	3558	3071	301	

Annexure-46

Total number of asset failures during 1993-94 to 1997-98(Year-wise, Railway-wise)

Year	Railway	Locomotive failures			Other Rolleing Stock failure	Permanent way failure	O.H.E. failure	Signalling apparatus failure
		Steam	Diesel	Electric				
1993-94	CR	0	1489	2392	30887	397	188	23241
	ER	237	184	97	214	48	9	3
	NR	54	1946	831	3575	612	24	24607
	NE							
	NF	40	592	0	1165	45	0	20919
	SR	0	437	462	1892	224	35	13017
	SC	73	205	648	19	185	4	14000
	SE	56	66	547	142	250	36	28
	WR	236	480	447	8886	481	23	7629
	METRO	0	0	0	24	4	0	0
	KRC	0	0	0	0	0	0	0
	TOTAL	696	5399	5424	46804	2246	319	103444

Year	Railway	Locomotive failures			Other Rolleing Stock failure	Permanent way failure	O.H.E. failure	Signalling apparatus failure
		Steam	Diesel	Electric				
1994-95	CR	0	1248	2574	25672	391	157	19334
	ER	696	169	65	272	44	14	11
	NR	21	2458	928	4341	497	15	24343
	NE							
	NF	12	593	0	661	33	0	15053
	SR	0	338	314	1630	192	27	10856
	SC	56	168	455	14	152	8	10559
	SE	0	707	397	85	195	32	18
	WR	84	373	356	7437	383	10	7498
	METRO	0	0	0	36	9	0	0
	KRC	0	0	0	0	0	0	0
	TOTAL	869	6054	5089	40148	1896	263	87672

Year	Railway	Locomotive failures			Other Rolleing Stock failure	Permanent way failure	O.H.E. failure	Signalling apparatus failure
		Steam	Diesel	Electric				
1995-96	CR	0	1182	2310	19657	313	124	15448
	ER	0	748	50	194	55	23	22
	NR	0	2352	1432	4275	427	12	20958
	NE							
	NF	15	572	0	427	51	0	10930
	SR	0	341	321	1924	167	31	9940
	SC	0	124	405	16	122	7	8634
	SE	0	698	555	102	135	38	30
	WR	175	309	289	4902	284	7	7126
	METRO	0	0	0	37	5	0	0
	KRC	0	0	0	0	9	0	0
	TOTAL	190	6326	5362	31534	1568	242	73008

Year	Railway	Locomotive failures			Other Rolleing Stock failure	Permanent way failure	O.H.E. failure	Signalling apparatus failure
		Steam	Diesel	Electric				
1996-97	CR	0	1099	1959	16420	318	67	13740
	ER	0	719	66	59	22	0	0
	NR	0	2087	1099	3679	407	14	21975
	NE							
	NF	7	549	0	317	25	0	9246
	SR	0	261	321	1542	177	25	8658
	SC	0	104	355	14	118	5	6146
	SE	0	539	368	100	60	27	45
	WR	152	243	276	4084	234	8	4897
	METRO	0	0	0	19	8	0	0
	KRC	0	N. A	0	0	126	0	N. A
	TOTAL	159	5601	4444	26234	1495	146	64707

Year	Railway	Locomotive failures			Other Rolleing Stock failure	Permanent way failure	O.H.E. failure	Signalling apparatus failure
		Steam	Diesel	Electric				
1997-98	CR	0	1067	1971	7710	290	81	11280
	ER	0	404	76	77	19	5	6
	NR	0	3854	1161	5886	762	11	40881
	NE							
	NF	0	356	0	256	12	0	6989
	SR	0	256	275	1365	140	25	8005
	SC	0	114	376	8	115	11	4841
	SE	0	651	376	48	43	25	47
	WR	90	237	262	3102	318	9	4159
	METRO	0	0	0	6	10	0	0
	KRC	0	17	0	0	525	0	948
	TOTAL	90	6956	4497	18458	2234	167	77156

Year	Railway	Locomotive failures			Other Rolleing Stock failure	Permanent way failure	O.H.E. failure	Signalling apparatus failure
		Steam	Diesel	Electric				
1993-94 to 97-98	CR	0	6085	11206	100346	1709	617	83043
	ER	933	2224	354	816	188	51	42
	NR	75	12697	5451	21756	2705	76	132764
	NE	0	0	0	0	0	0	0
	NF	74	2662	0	2826	166	0	63137
	SR	0	1633	1693	8353	900	143	50476
	SC	129	715	2239	71	692	35	44180
	SE	56	2661	2243	477	683	158	168
	WR	737	1642	1630	28411	1700	57	31309
	METRO	0	0	0	122	36	0	0
	KRC	0	17	0	0	660	0	948
	TOTAL	2004	30336	24816	163178	9439	1137	406067

Annexure-47

Cost of damage to Railway property and interruption to through communication during 1993-94 to 1997-98 (year-wise, Railway-wise)

Year	Railway	Rolling stock inclusive of engines	Permanent way	O.H.E.	Signalling apparatus	Total	Interruption to through communication (in hours)
		(Rupees in lakhs)					
1993-94	CR	817	555	0	0	1372	754.35
	ER	305	65	9	3	382	431
	NR	282.30	96.21	4.88	4.21	387.6	627.15
	NE	73.29	16.81	0	0.45	90.55	363.47
	NF	406	4	0	0.45	410.45	894.01
	SR	0	0	0	0	0	0
	SC	311.80	191.47	0	0	503.27	532.08
	SE	3.4	5.1	9	1.7	19.2	1613
	WR	444.96	45.6	7.95	3.455	501.965	822.51
	METRO	0	0	0	0	0	0
	KRC	0	0	0	0	0	0
	TOTAL	2643.75	979.19	30.83	13.265	3667.035	6037.57

Year	Railway	Rolling stock inclusive of engines	Permanent way	O.H.E.	Signalling apparatus	Total	Interruption to through communication (in hours)
		(Rupees in lakhs)					
1994-95	CR	926	249	0	0	1175	514.4
	ER	232	54	12	5	303	252
	NR	432.44	116.86	13.04	5.89	568.23	85.00
	NE	18.65	5.65	0	0.05	24.35	273.53
	NF	98	70	0	1	169	1047.01
	SR	131	56	3.9	0.76	191.66	367.32
	SC	358.40	49.03	0	0	407.43	613.36
	SE	470	378	53	0.3	901.3	2376
	WR	451.64	45.06	3.9	4.99	505.59	608.5
	METRO	1	0	0	0	1	0
	KRC	0	0	0	0	0	0
	TOTAL	3119.13	1023.6	85.84	17.99	4246.56	6137.12

Year	Railway	Rolling stock inclusive of engines	Permanent way	O.H.E.	Signalling apparatus	Total	Interruption to through communication (in hours)
		(Rupees in lakhs)					
1995-96	CR	446	132	0	0	578	551.42
	ER	1264	129	41	12	1446	268
	NR	265.59	154.16	10.75	2.64	433.14	403.59
	NE	40.33	11.68	0	2.05	54.06	316.24
	NF	47	80	0	0.66	127.66	626.5
	SR	411	102	4.95	1.1	519.05	394.46
	SC	477.77	47.10	0	0	524.87	256.55
	SE	1031	1419	60	1	2511	1571
	WR	47.47	21.19	6.08	2.1	76.84	421.33
	METRO	1	0	0	0	1	0
	KRC	0	0	0	0	0	0
	TOTAL	4031.16	2096.13	122.78	21.55	6271.62	4809.09

Year	Railway	Rolling stock inclusive of engines	Permanent way	O.H.E.	Signalling apparatus	Total	Interruption to through communication (in hours)
		(Rupees in lakhs)					
1996-97	CR	486	283	0	0	769	321.21
	ER	685	95	9	5	794	370
	NR	255.52	291.22	4.20	17.33	568.27	864.56
	NE	14.93	6.42	0	1.38	22.73	138.5
	NF	118	36	0	1	155	612
	SR	212	194	102	52.6	560.6	537.19
	SC	287.58	264.10	0	0	551.68	301.35
	SE	920	714	106	1	1741	4
	WR	49.975	52.02	1.45	5.28	108.725	462.2
	METRO	7.5	5	0	0	12.5	0
	KRC	14	1.33	0	0	15.33	18.4
	TOTAL	3050.505	1942.09	222.65	83.59	5298.035	4739.41

Year	Railway	Rolling stock inclusive of engines	Permanent way	O.H.E.	Signalling apparatus	Total	Interruption to through communication (in hours)
		(Rupees in lakhs)					
1997-98	CR	614	216	0	0	830	355.18
	ER	923	60	3	1	987	243
	NR	509.12	491.52	7.35	3.38	1011.37	548.37
	NE	14.06	5.06	0	0.02	19.32	214.12
	NF	134	37	0	3	174	546.47
	SR	71	8	10.6	4.7	94.3	415.06
	SC	490.41	268.65	0	0	759.06	236.26
	SE	670	127	8	2	807	1106
	WR	115.09	50.08	1.41	1.05	167.63	518.07
	METRO	0.25	1.75	0	0	2	0
	KRC	20.3	2.68	0	0	22.98	68.05
	TOTAL	3561.23	1267.74	30.36	15.15	4874.48	4250.58

Year	Railway	Rolling stock inclusive of engines	Permanent way	O.H.E.	Signalling apparatus	Total	Interruption to through communication (in hours)
		(Rupees in lakhs)					
1993-94 to 97-98	CR	3289	1435	0	0	4724	2496.56
	ER	3409	403	74	26	3912	1564
	NR	1744.97	1149.97	40.22	33.45	2968.61	2528.67
	NE	161.26	45.62	0	3.95	211.01	1305.86
	NF	803	227	0	6.11	1036.11	3725.99
	SR	825	360	121.45	59.16	1365.61	1714.03
	SC	1925.96	820.35	0	0	2746.31	1939.6
	SE	3094.4	2643.1	236	6	5979.5	7780
	WR	1109.135	213.95	20.79	16.875	1360.75	2832.61
	METRO	9.75	6.75	0	0	16.5	0
	KRC	34.3	4.01	0	0	38.31	86.45
	TOTAL	16405.775	7308.75	492.46	151.545	24358.53	25973.77

List of abbreviations used

AEE	Assistant Electrical Engineer
AEN	Assistant Engineer
AME	Assistant Mechanical Engineer
ART	Accident Relief Train
ASM	Assistant Station Master
ATC	Automatic Train Control
AWS	Auxiliary Warning System
BCN	Air braked eight-wheeler covered wagon
BEL	Bharat Electronics Limited
BG	Broad Gauge
BOX	Vacuum braked eight-wheeler open wagon
BOX N	Air braked eight-wheeler open wagon
BRI	Bridge Inspector
CC	Closed Circuit
CCRS	Chief Commissioner of Railway Safety
CLW	Chittaranjan Locomotive Works
CR	Central Railway
CRB	Chairman, Railway Board
CRS	Commissioner of Railway Safety
CRT	Vacuum braked four-wheeler covered wagon
CSO	Chief Safety Officer
CWR	Continuous Welded Rails
C&W	Carriage & Wagon
DA	Daily Allowance
DB AG	German Railways
DG	Director General
DR	Direct Recruitment
DRF	Depreciation Reserve Fund
DRM	Divisional Railway Manager

DSO	Divisional Safety Officer
ED	Executive Director
ER	Eastern Railway
EMU	Electric Multiple Unit
ESM	Electrical Signal Maintainer
FBW	Flash Butt Welding
GM	General Manager
GMT	Gross Million Tonnes
GPS	Global Positioning System
HOD	Head of Department
HOER	Hours of Employment Regulations
ICF	Integral Coach Factory
IOW	Inspector of Works
IR	Indian Railways
IRCA	Indian Railway Conference Association
ISO	International Standards Organisation
IT	Information Technology
ITI	Industrial Training Institute
IRCAMTECH	Indian Railways Technology Centre for Advanced Management
JAG	Junior Administrative Grade
JCM	Joint Consultative Machinery
JSO	Junior Scientific Officer
KC	Vacuum braked four-wheeler open wagon
KRC	Konkan Railway Corporation
LC	Level Crossing
LDCE	Limited Departmental Competitive Examination
LI	Loco Inspector
LVCD	Last Vehicle Checked Device
LWR	Long Welded Rail
MACL	Multiple Aspect Colour Light Signalling

MG	Meter Gauge
MP	Member of Parliament
MSM	Mechanical Signal Maintainer
NCO	Neutral Control Organisation
NER	North-Eastern Railway
NFR	Northeast Frontier Railway
NG	Narrow Gauge
NR	Northern Railway
NTXR	Neutral Train Examiner
OHE	Over Head Equipment
PC	Pre-stressed Concrete
PHOD	Principal Head of Department
PNM	Permanent Negotiating Machinery
POH	Periodic Over-Haul
PPM	Parts Per Million
PRC	Pre reinforced concrete sleeper
PSC	Pre-stressed Concrete Sleeper
PWI	Permanent Way Inspector
PWM	Permanent Way Mistry
RCT	Railway Claims Tribunal
RDSO	Research Designs & Standards Organisation
RITES	Rail India Technical & Economic Services
ROH	Routine Over-Haul
RRB	Railway Recruitment Board
RSC	Railway Service Commission
SAG	Senior Administrative Grade
SC	Scheduled Caste
SCR	South Central Railway
SER	South-Eastern Railway
SM	Station Master
SNCF	French National Railways

SPAD	Signal Passed at Danger
SR	Southern Railway
SSO	Senior Scientific Officer
ST	Scheduled Tribe
S&T	Signalling & Telecommunication
TAWD	Train Actuated Warning Device
TI	Traffic Inspector
TPWS	Train Protection & Warning System
TXR	Train Examiner
UIC	International Union of Railways
UK	United Kingdom
UPSC	Union Public Service Commission
USFD	Ultra Sonic Flaw Detection
UTS	Ultimate Tensile Strength
WR	Western Railway
ZTC	Zonal Training Centre



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