

## Chapter 1 Disaster Management in Indian Railways

### 1.1 Highlights

- Disaster management plans of the zonal railways and the divisions were not comprehensive, lacked uniformity and did not adhere to the provisions of the Disaster Management Act, 2005 and the recommendations of the High Level Committee constituted by Ministry of Railways.  
*(Para 1.10.1)*
- Provision of rescue and relief equipments – Self Propelled Accident Relief Trains (SPARTs), Accident Relief Trains (ARTs), Accident Relief Medical Vans (ARMVs), Breakdown Cranes etc was inadequate and maintenance was deficient. Speed restrictions and non-placement of relief equipments strategically in the divisions curtailed speedy response to disasters. The state of preparedness was not geared up to envisaged levels.  
*(Paras 1.10.2.1 to 1.10.2.3)*
- Facilities in hospitals for the deceased and in trains were inadequate and the communication facilities from trains and disaster sites were weak.  
*(Paras 1.10.2.4 to 1.10.2.6)*
- Coordination arrangements with State Governments/District authorities as well as other agencies were weak and Railways were unable to harness their infrastructure while responding to disasters.  
*(Para 1.10.3)*
- Training - a vital tool to hone the skills of staff- did not receive requisite importance. Even basic training in First Aid and disaster management were not imparted to most of the frontline staff. Specialised training programmes were cancelled due to poor participation. Setting up of a Railway Disaster Management Institute at Bangalore was in a nascent stage and crack team of rail rescue experts has not been formed.  
*(Para 1.10.4)*
- Railways were neither able to rapidly access the disaster sites nor provide organised rescue and relief during the ‘Golden hour’- the first hour after the accident. Delayed arrival of relief equipments at the disaster sites also led to delayed restoration of rail traffic causing diversions and cancellation of trains. Railways also lacked the expertise to deal with water related disasters.  
*(Para 1.11.1 to 1.11.3)*
- Assets were not renewed or rehabilitated in a timely manner. Safety aids were not provided and the safety measures initiated for prevention and mitigation of disasters were inadequate.  
*(Para 1.12.1)*

- **Surveillance mechanisms in railway stations were inadequate and the RPF was ineffective in preventing unauthorised entry into station premises.**

*(Para 1.12.2)*

## **1.2 Gist of recommendations**

- Railways need to formulate an integrated disaster management plan to facilitate a cohesive approach to comprehensively address all aspects of disaster management. The zonal and the divisional disaster management plans need to be revised on priority basis to eliminate existing shortcomings.
- Railways should augment its infrastructure of relief equipments, facilities in hospitals and in trains to the envisaged scale and initiate effective measures to maintain the relief equipments fully equipped and in a state of operational readiness.
- Railways should on priority, address the issues of operational constraints imposing speed restrictions, positioning the relief trains/medical vans, cranes etc in a manner that optimises the response time, which is the essence of any response mechanism.
- Railways should quickly provide communication system in trains and in relief trains for transmission of real time information from the disaster site, which is essential in assessing the gravity of the disaster and in organising rescue and relief.
- Railways should enter into formal coordination arrangements with the State Governments/District authorities, civil/private hospitals and other agencies so as to effectively leverage their infrastructure while responding to disasters.
- Railways need to constitute dedicated teams and initiate tangible measures to quicken the pace of providing specialised training in order to develop a trained team to handle any disaster. Railways should also effectively harness the services of private contractors on board the trains to augment its preparedness
- Railways need to improve the response time in order to provide effective post incidence response to disasters. Railways also need to effectively monitor the movement of relief equipments so as to ensure their timely availability at the disaster sites. Railways need to enhance their state of preparedness in handling disasters involving water bodies.
- Railways need to ensure that assets are promptly replaced and rehabilitated, safety aids are adequately provided and manpower and other infrastructure are effectively monitored to enhance safety of trains.
- Railways need to enhance the surveillance mechanism in the railway stations and institute an effective mechanism to prevent unauthorised entry into station premises.

### 1.3 Introduction

In India, the railways are the most preferred mode of transport both for the movement of people and goods consignments in bulk. Indian Railways is spread over a vast geographical area over 63000 route kilometers. Unlike in other countries where the role of Railways, in the event of a disaster, is restricted to clearing and restoring the traffic, in our country Indian Railways handles the rescue and relief operations. The 'Citizen Charter' of the Indian Railways also spells out the railways' commitment in providing safe and dependable train services to passengers.

The Indian Railways were managing disasters relating to train accidents in accordance with the rules and procedures contained in the Accident Manual 1992. Increasing traffic density, longer length of trains with a large number of passengers on board, higher operational speeds of trains, emerging technologies etc., called for a paradigm shift from the existing level of preparedness and readiness to combat any disastrous situation to a much higher level of an

effective 'Disaster Management System'.

Consequently, Ministry of Railways constituted

(September 2002) a High Level Committee (HLC) to review the disaster management system over the Indian Railways related to train accidents and

natural calamities and to identify additional technological and managerial inputs required to quicken the pace of rescue, relief and restoration of operations. The Committee recommended additional inputs to be in place within a period ranging from three to 36 months and all of its 111 recommendations were accepted (April 2003) by the Railway Board. Since the HLC did not address disasters such as earthquakes, floods, cyclones, fires,

industrial accidents, accidents involving trains carrying

explosives/inflammable/hazardous material,

Ministry of Railways constituted (January 2004) another

Committee to address these disasters. This Committee is yet to

#### *Major recommendations of HLC*

- Detailed disaster management plans should be devised at the zonal and divisional levels.
- Relief trains and medical vans should be adequately provided, strategically located, upgraded to operate at higher speed and equipped with modern equipments.
- Rescue ambulances and other infrastructure should be provided including facilities in hospitals. Communication facilities should be upgraded.
- MoUs should be entered into with State Governments, public/private agencies, Armed forces etc to improve the response time during disasters.
- Crack rescue teams should be formulated. Specialised training in rescue, extrication, relief and restoration techniques should be provided to staff.

#### *Salient features of the Corporate Safety Plan*

- Extensive use of Anti Collision Device (ACD) to prevent collisions.
- Replacement of overaged tracks bridges, Signal & Telecommunication gears and rolling stock to reduce derailments.
- Manning of unmanned level crossings and use of Train Actuated Warning Device and ACD to reduce level crossing accidents.
- Introduction of modern bridge inspection and management system.
- Filling up of safety category posts.

finalise its recommendations.

The Ministry of Railways also formulated (August 2003) a Corporate Safety Plan as a means to realise the vision of an accident free and casualty free Indian Railway system. Apart from addressing the safety concerns, in its Corporate Safety Plan, Ministry of Railways reiterated its focus on modernisation of Disaster Management. While the Corporate Safety Plan addressed the causes that lead to disasters and was preventive in nature, HLC's focus was on effective management of disasters.

Further, the Central Government promulgated (December 2005) a Disaster Management Act 2005. Prior to formal promulgation of the Act, Ministry of Railways had nominated (January 2003) Additional Member (Mechanical) as a member of the National Disaster Management Authority (NDMA) to represent Ministry of Railways. Since the HLC was already constituted to review and upgrade the disaster management system in Indian Railways, Ministry of Railways issued instructions from time to time to zonal railways to ensure compliance on specific issues.

<p style="text-align: center;"><b><i>Disaster Management Act 2005</i></b></p> <p>The Disaster Management Act, 2005 stipulates that Ministries of Government of India shall be responsible for taking measures necessary for prevention, mitigation, capacity building and to respond effectively to any threatening disaster situation or a disaster in accordance with the guidelines of the National Disaster Management</p>
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#### **1.4 Organisational structure**

A number of Directorates in the Railway Board are involved in addressing disaster management and related safety concerns of which the main ones responsible for issue of policy guidelines are the Safety, Mechanical, Health, Traffic, Commercial and Security directorates. The overall implementation rests with the respective departments of zonal railways, with the Safety Department being the nodal department to handle all disaster management related issues.

#### **1.5 Audit objectives**

The Performance Audit on Disaster Management in the Indian Railways was carried out with a view to assess whether the:

- emergency preparedness of the Railways for handling disasters was adequate;
- post incidence (post disaster) response of the Railways was adequate and effective; and
- safety and security issues, which contribute to prevention of accidents and disasters, were adequately addressed.

#### **1.6 Audit scope, criteria and methodology**

Disasters on the railway network are a consequence of human and equipment failures, natural calamities and acts of sabotage and comprise collisions and derailments of trains, accidents at level crossings, fires on trains; floods, cyclones, earthquakes, bomb blasts, terror attacks and other destructive/disruptive activities. This report is confined to management of

disasters as a consequence of train accidents, natural calamities and acts of sabotage that impact train operations on the rail network.

The Disaster Management Act 2005, the report of the High Level Committee, Corporate Safety Plan of Railways and the instructions issued by Railway Board from time to time were used as audit criteria.

The policy decisions taken by Railway Board in respect of disaster management were studied and records relating to their implementation in various zonal railways during the past four years i.e., 2003-04 to 2006-07 were reviewed. Joint inspections with railway authorities were also carried out on a selected sample of trains, divisional hospitals, relief trains, medical vans and stations to capture the prevailing ground condition.

### **1.7 Sample selection**

A sample of 31 divisions over the sixteen zonal railways and Metro Railway Kolkata were selected for review of the implementation of certain specific directives on disaster management, while provision of major infrastructure was analysed over all the 67 divisions and Metro Railway Kolkata over Indian Railways. Further, a sample of 95 trains, 50 divisional hospitals, 90 relief trains and 67 medical vans were selected for conducting joint inspections. Indian Railways categorise stations on the basis of earnings, which broadly reflects the number of passengers using a station. A sample of 138 stations from various categories was also selected to review the safety and security measures in place. Details of the selected sample are given in **Annexure –I**.

### **1.8 Acknowledgement**

The audit objectives, scope and methodology were discussed by the Principal Directors of Audit in the zones with the respective General Managers and concerned departmental heads in entry and exit conferences. The input provided on various aspects including suggestions for sample selection and support provided by railway officials while conducting joint inspections in the field is acknowledged with thanks. The co-operation extended by Railway Board during the course of audit is also appreciated.

### **1.9 Audit findings**

Performance Audit of disaster management in the Indian Railways was undertaken against the above background and the results of audit are given in the following three sections:

- Emergency preparedness
- Post incidence response and
- Safety and security issues

#### **1.10 Emergency preparedness**

Disaster management is ‘a continuous and integrated process of planning, organising, coordinating and implementing measures necessary for prevention of danger or threat of any disaster, mitigation or reducing the risk of any disaster or its severity or consequences, capacity building, preparedness to deal with any disaster, prompt response to any threatening disaster situation or

disaster, assessing the severity or magnitude of effects of any disaster, evacuation, rescue and relief, rehabilitation and reconstruction'<sup>1</sup>. Capacity building for emergency preparedness was therefore an integral part of disaster management.

Audit observations in respect of emergency preparedness are as follows:

- The Committee formed in January 2004 was to provide recommendations for Railways' response in all types of disasters such as earthquake, floods, cyclones, fires, industrial accidents, accidents involving trains carrying explosives/ inflammable/ hazardous materials and the training needs for keeping the system in a state of alertness and to evolve a professional crisis management all over Indian Railways (IR). The Committee's recommendations were to be dovetailed with the National Disaster Management Authority's Global Disaster Management Plan for the country. Even after a lapse of three years, the Committee was yet to submit its report and in the absence of any other specific plan of action to deal with these issues, the emergency preparedness of the Indian Railways was certainly compromised to that extent.
- A review of emergency preparedness across IR revealed inadequacies in the disaster management plans, inadequate provision and maintenance of infrastructure – Self Propelled Accident Relief Trains, Accident Relief Trains and Accident Relief Medical Vans, other rescue and relief equipments, facilities in hospitals, facilities in trains and communication facilities, poor coordination arrangements, inadequacy of trained manpower and inadequate monitoring mechanism as brought out in paragraphs 1.10.1 to 1.10.5.

#### **1.10.1 Inadequacies in disaster management plans**

The Disaster Management Act 2005, stipulates that every Ministry should prepare a disaster management plan specifying among others (i) the measures to be taken for prevention and mitigation of disasters, (ii) its roles and responsibilities in relation to preparedness and capacity building, promptly and effectively responding to disasters (iii) present status of preparedness and the measures required to be taken to perform its roles and responsibilities. The plans so drawn are to be reviewed and updated annually. The HLC also recommended that all zonal railways and divisions must devise their disaster management plan taking into account the details of the local resources available with them, their neighbouring divisions/ zonal railways, civil authorities and armed force bases and dovetail the same with the District/State disaster management plans respectively. Scrutiny of the various disaster management plans prepared by zonal railways and divisions revealed the following deficiencies:

- While accidents were defined as 'any occurrence which does or may affect the safety of the Railways, its engines, rolling stock, permanent way, works, passengers, railway servants, others or which does or may cause delays to trains or loss to the railway', IR did not adopt a comprehensive

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<sup>1</sup> As per the Disaster Management Act, 2005

definition of disaster for uniform applicability over the entire IR network. The definition of “disaster” adopted by the various zonal railways varied widely. Most of the definitions did not incorporate any quantifiable and objective parameter to assess disasters. While WR and CR reckoned an accident involving injuries to more than 50 persons and a long duration of interruption of traffic as disaster, NER considered an accident as a disaster only when the number of casualties exceeded 75 and ECR reckoned an accident involving more than 100 injuries as a disaster. Even in these four zonal railways, the duration of interruption of traffic was not expressed in terms of number of hours.

Further, while a majority of the zonal railways considered various cases of human/equipment failures, natural calamities and acts of sabotage that could cause disasters, the disaster management plans of four zonal railways (ER, NR, NFR and NWR) were restricted only to train accidents such as derailments, collisions, fires and explosions in trains and level crossing accidents. Acts of sabotage were not considered by SER as disasters.

Under the existing mechanism, the gravity of a disaster would, therefore, be comprehended differently by the various zonal railways and the entire approach thereby lacked cohesiveness.

- Lack of a concerted effort from Railway Board to ensure cohesiveness contributed to the various deficiencies in the zonal and divisional disaster management plans. The zonal disaster management plans of 10 (WR, SR, CR, ER, NR, SCR, NER, ECR, ECoR and NCR) of the 16 zonal railways and Metro Railway Kolkata were deficient since they did not provide for the measures taken either for prevention or for mitigation of disasters as required by the Disaster Management Act 2005.
- While the roles and responsibilities were provided for in all the zonal plans, the present status of preparedness was not mentioned in two zonal plans (SR and SCR).
- In spite of the Railway Board’s detailed instructions of July 2004, 13 zonal railways (except SECR, NWR and WCR and Metro Railway Kolkata) did not dovetail its zonal plans with the plans of the respective State Governments. In SR SCR and SWR, the zonal railways were not even in possession of the State plan and in WR dovetailing could not be completed since the zonal railway was yet to identify the areas where assistance from the State/District authorities was required. In SCR, action was not even initiated to finalise the standing arrangements with State/District Authorities, Armed Forces etc., to ensure proper coordination and mutual cooperation in the hour of need and the Railway Board’s instructions largely remained ineffective.
- The zonal disaster management plans of eight zonal railways (SR, CR, SCR, SWR, SER, SECR, NWR and ECR) and Metro Kolkata did not provide for the details of the organisations having infrastructural facilities

useful in disaster management and the resources available with civil authorities as recommended by the HLC.

- While seven zonal railways (SR, NR, SER, NER, NWR, SECR and NCR) did not update the zonal plans since their preparation, the zonal plan of WCR was not updated annually and was last updated in March 2005.
- Railway Board advised (December 2004) that electronic forms of all zonal and divisional disaster management plans be loaded on the Railnet server/website of zonal railways so that all railway authorities concerned could make use of such information. The disaster management plans of seven zonal railways (ER, NR, SCR, SWR, NFR, SECR and ECR) and Metro Kolkata were not available on the website of the respective zonal railway. In SR, even though electronic forms of the disaster management plans were put on the website, expeditious search of required information was not facilitated, defeating the very purpose of making the plans available on the website.
- Two zonal railways (ECR and NCR) did not issue the pocket booklet of Do's and Dont's to all officials. In SECR, the provision of issue of booklet was not incorporated in the divisional plans of two (Nagpur and Bilaspur) out of the three divisions.
- Similar deficiencies existed in a number of the divisional disaster management plans. Twenty two<sup>2</sup> out of the 67 divisions had not updated the disaster management plans since their preparation. Sixteen<sup>3</sup> divisional plans did not lay down the methodology of seeking coordination from the State Governments.
- Nanded Division of SCR was yet to formulate a disaster management plan.
- Further, the divisional plans of SR, SCR, SWR, ECR, Rangiya Division of NFR, Nagpur and Bilaspur Divisions of SECR were not even dovetailed with their respective zonal plans.
- Even though IR had sections in its network, which had a lot of tunnels, the divisional plans did not have any action plan to tackle disasters in tunnels as provided in the disaster management plan of Konkan Railway Corporation Limited.
- Railway Board directed (December 2004) that to ensure uniformity, the divisional plans should contain a detailed inventory of railway and non-railway resources as envisaged by HLC and that information common to all divisions should be provided in the zonal plan and replicated in all the divisional plans. The detailed inventory of resources was not provided for in the plans of eight<sup>4</sup> divisions and the common infrastructure of the

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<sup>2</sup> Chennai, Palghat, Tiruchchirapalli, Trivandrum, Bhusawal, Delhi, Ferozepur, Lucknow, Izatnagar, Varanasi, Ranchi, Ajmer, Bikaner, Nagpur, Sambalpur, Bhopal, Jabalpur, Kota, Hubli, Jhansi, Allahabad and Agra.

<sup>3</sup> Bhavnagar, Chennai, Palghat, Madurai, Tiruchchirapalli, Trivandrum, Ferozepur, Secunderabad, Hyderabad, Vijayawada, Guntur, Guntakal, Bangalore, Mysore, Hubli and Lumding.

<sup>4</sup> Secunderabad, Hyderabad, Vijayawada, Guntur, Guntakal, Mysore, Bangalore and Lumding.



respective zonal railway was not replicated in the disaster management plans of 22<sup>5</sup> divisions.

- None of the disaster management systems were ISO certified.

Thus, most of the zonal and the divisional plans were not comprehensive, lacked uniformity and also did not adhere to the provisions of the Disaster Management Act 2005 and the recommendations of HLC.

### **Recommendations**

*IR needs to formulate an integrated disaster management plan to facilitate a cohesive approach to comprehensively address all aspects of disaster management. The zonal and the divisional disaster management plans need to be revised on priority basis to eliminate existing shortcomings.*

#### **1.10.2 Inadequate provision and maintenance of infrastructure**

The HLC recognised that the strategy for setting up of an effective disaster management system in the Indian Railways had to be based on stronger and appropriate infrastructure, backed by a well trained team of disciplined and dedicated staff. The HLC recommended provision of infrastructure in terms of rescue and relief equipments such as relief trains, medical vans, breakdown cranes, rescue ambulances etc to reach the site quickly and to carry out rescue and relief operations, adequate facilities in railway hospitals to take care of the victims and facilities in coaches of trains to assist rescue and relief. Review of the infrastructure provided in all the 67 divisions and in a sample of 50 divisional hospitals and 95 trains across IR disclosed the following:

##### **1.10.2.1 Self Propelled Accident Relief Trains**

The HLC recommended, in April 2003, provision of a three coach Self Propelled Accident Relief Train (SPART) in each division within a period of three years. The SPARTs were also to be upgraded to run at a speed of 140 kilometers per hour. The HLC had recommended provision of various tools equipments relevant for rescue and relief operations. A review, however, revealed the following deficiencies:

- Even after a lapse of four years, as against the target of provision of 67 three coach SPARTs only six SPARTs were provided (Chennai and Palghat in SR, Chakradharpur in SER, Khurda Road, Sambalpur and Waltair in ECoR) in the entire railway network. The two coach SPARTs available in 12 other divisions across nine zonal railways<sup>6</sup> have not been converted into three coach SPARTs.
- None of the existing SPARTs were fit to run at the designated speed of 140 kilometers per hour.

<sup>5</sup> Ratlam, Chennai, Palghat, Madurai, Tiruchchirapalli, Trivandrum, Ferozepur, Secunderabad, Hyderabad, Vijayawada, Guntur, Guntakal, Bangalore, Mysore, Hubli, Lumding, Rangiya, Nagpur, Sonepur, Jhansi, Allahabad and Agra.

<sup>6</sup> Mumbai Central, Vadodara, Howrah, Sealdah, Ambala, Secunderabad, Vijayawada, Varanasi, Lumding, Bikaner, Bhopal and Jhansi.

- A joint inspection of 12 SPARTs across nine zonal railways further revealed that:
  - Some of the vital tools and equipments required for rescue and relief operations such as self contained breathing apparatus and inflatable tents were not available in most of the SPARTs. Only one SPART (placed in Vijayawada) was provided with the prescribed number of four sets of self contained breathing apparatus.
  - Equipment useful in maintaining communications such as WLL exchange and PC with high speed satellite modem were provided only in four and one SPARTs respectively. Even out of these, the WLL exchange was not commissioned in two SPARTs. Similarly, four SPARTs were found to have lesser number of walkie talkie sets than the prescribed scale of 30 sets.
  - In five SPARTs, the prescribed number of emergency inflatable lighting towers for effective general illumination was not provided. Further, the staff of the SPART at Khurda Division was neither trained nor was any demonstration organised to familiarise the staff with the operations of the device. Thus, the staff could not operate the device.
  - The stock register of SPART at Chennai Division of SR revealed disposal of various items as 'rat damaged'. Rusty surgical equipments requiring replacement were available and the expiry dates of medicines were incorrectly exhibited.
  - The medical van of the SPART of Chakradharpur Division of SER did not have any item other than some injections and basic medicines like Analgin, Paracetamol and pre-sterilised disposable dressings.

- Further, on two occasions of major accidents, the SPART located at Chennai Division of SR, which was self propelled, had to be hauled with the assistance of a locomotive. Similarly, during a trial run, the SPART at Palghat Division of SR could not be moved due to an error in its engine, indicating that the SPARTs were not maintained in good fettle.



The SPART at Chennai Division

- The SPART at Jharsuguda in Chakradharpur Division of SER was placed at a crippled siding and was being hauled from its base to the railway station with the service of one shunting engine as there was no earmarked driver at the siding to get the SPART to Jharsuguda station, where the driver and other accident relief staff boarded the SPART. It usually took 10 to 30 minutes to get the SPART to the station on each occasion, which increased the response time and defeated the very purpose of having a

specialised self propelled vehicle to quickly respond to an emergency situation.

#### **1.10.2.2 Accident Relief Trains and Accident Relief Medical Vans**

The HLC recommended provision of Accident Relief Trains (ARTs) and Accident Relief Medical Vans (ARMVs) with various tools and equipments required for aiding rescue and relief operations. A review, however, revealed the following deficiencies.

- To improve the response time, HLC recommended that ARMVs could be stationed at intervals not exceeding 100 kilometers each. ARMVs in 26 out of 60 divisions across IR were less than the assessed requirements. The assessed requirements of the remaining seven divisions and Metro Railway Kolkata were not available. The provision of ARMVs was, therefore, inadequate and inevitably curtailed speedy response to emergency situations.
- HLC did not prescribe any scale for provision of ARTs. However, it recommended that the speed of the ARTs be upgraded to 100 kilometers per hour. Audit observed that 61 ARTs out of a total of 168 ARTs available across IR were not upgraded to run at the speed of 100 kilometers per hour.
- Some cases were noticed where even though the ARTs were upgraded, various operational restrictions effectively limited the speed of the ARTs and the up gradation of the ARTs did not serve the intended purpose. In ER, the loop lines served by the ARTs /ARMVs located at Rampurhat station had a track speed capacity of 90 kilometers per hour, which was limiting the running capacity of the ART. Further, the ART at Asansol in ER consisted of three coaches and two wagons. While the coaches were upgraded to operate at a speed of 100 kilometers per hour, the wagons could only operate at a speed of 65 kilometers per hour, which effectively restricted the overall running speed of the ART. Similar position prevailed in SCR, where all the wagons of the ART were only fit to run at a speed of 75 kilometers per hour. In WCR, the operational speed of the two ARTs in Kota Division was restricted by the break down cranes, which were kept separately in another line, and the crane composition had a speed of only 75 and 60 kilometers per hour.
- Though HLC recommended that the location of the ARTs and ARMVs should be reviewed, rationalised and relocated wherever necessary after addressing the unreasonable clusters or long gaps in the existing placement of ARTs, the ARTs were either not strategically located or conveniently placed in all the divisions, which delayed the availability of ARTs at the disaster sites as shown below.

Zonal Railway	Division	Number of SPARTs and ARTs	Location of SPARTs and ARTs	Observation
SR	Chennai	1 SPART and three ARTs	SPART- Chennai Two ARTs at Tondiarpet and Basin Bridge	SPART and two ARTs located at a distance of 8 kms of each other
ER	Sealdah	1 SPART and two ARTs	SPART and one ART- Belehata near Sealdah One ART- Ranaghat	SPART and the two ARTs placed at a distance of 74 kms of each other
CR	Mumbai	3 ARTs	One ART at Kurla and one ART at Kalyan	Two of the three ARTs were located at a distance of 16 Kms and 54 kms from Mumbai.

- Further, in SCR, the ARTs in Vijayawada and Hyderabad Divisions were located at Rajahmundry and Nizamabad respectively, where availability of diesel locos to haul the ARTs was a constraint, while the SPARTs, which do not require a locomotive, were placed at Vijayawada and Secunderabad respectively which had diesel locomotives within their vicinity.

In ECoR, the ART placed at Talcher siding could move only in the forward direction and had to take a route, which was invariably occupied by goods trains blocking the exit point of the ART. In ECR, an ARMV was placed at Jhanjharpur and all the staff deployed on this ARMV



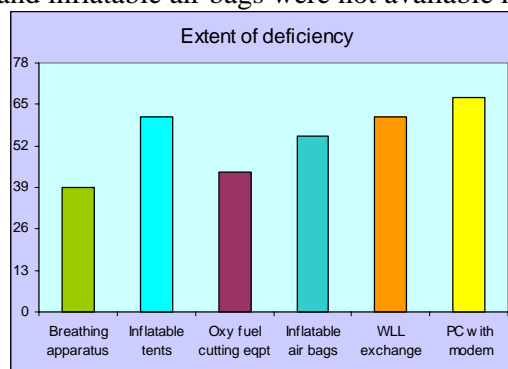
Pathway of ART blocked by a goods train at Talcher Station

was stationed at Railway Hospital, Darbhanga. In the event of an emergency, the staff had to travel a distance of 39 kilometers, which included 19 kilometers to be covered by road with the ongoing gauge conversion, to take charge of the ARMV. While HLC had mentioned that feasibility of entering into a tie up with private/ civil hospitals could be explored so that additional ARMVs could be located even in places where railway medical infrastructure was not available, no tie up was entered into with any private or civil hospital to handle the ARMV at Jhanjharpur, while responding to a disaster.

- The Workshops, which received the ART/ARMV coaches for periodical overhaul, were not returning the same coaches to the divisions after overhaul and the divisions, on many occasions, received another coach in place of the one sent for periodical overhaul. Due to this systemic weakness, apart from the details of the previous overhauls, recorded evidence of the persistent problems of the coaches were not traceable for a substantial number of coaches, thereby preventing specific attention to coaches in subsequent overhauls.

- In Samastipur Division of ECR, 24 out of the 31 coaches available were long over due (due dates were from 2002-03 to 2006-07) for periodical overhaul. Of these, 23 coaches are overaged for periods ranging from one year to 15 years. Even in NFR, 10 out of the 74 coaches available in Katihar and Lumding Divisions were over due for periodical overhaul, indicating that the ART coaches were poorly maintained and raised questions on their reliability during an emergency.
- A joint inspection of 78 ARTs and 67 ARMVs across IR further revealed that:

- Equipment such as self contained breathing apparatus, inflatable tents, oxy fuel cutting equipment and inflatable air bags were not available in 39, 61, 44 and 55 ARTs respectively.



- Equipment facilitating maintenance of communications such as WLL exchange and PC with high speed satellite modem was not available in 61 and 67 ARTs respectively. Further, the WLL exchange was not commissioned in four ARTs and the PC was without the modem in two ARTs.

- Automatic spring loaded measuring gauges used for measurement of track and rolling stock parameters were not provided in 25 ARTs.
- In 18 ARTs, the emergency inflatable lighting towers available were fewer than the prescribed scale of four sets
- Out of the six oxygen cylinders available in one ART in ECoR, three were found empty and no refilling was done.
- Augmented First Aid boxes, wrist bands to identify the injured and the dead, emergency inflatable lighting towers were not available in 15, 12 and 13 ARMVs. Similarly, digital video/still cameras were not available in 27 ARMVs and luminous jackets to be worn by the rescue workers were found to be less than the prescribed scale of 30 jackets in 15 ARMVs. Even basic facilities such as coffins and body bags were not available in six ARMVs.
- Most of the medicines and injections prescribed were not available in the ARMVs in Secunderabad and Vijayawada Divisions in SCR. Further, the physical verification of items in ARTs/ARMVs was also not being carried out regularly by SCR and SR.
- Further, delays were noticed in conversion of coaching stock into ARTs, which affected the availability of ARTs for managing disasters. As per the Rolling Stock Programme for the year 2006-07, Parel Workshop of CR had to convert 20 coaches into ARTs /ARMVs. Out of these, one coach was still lying in Dadar yard. NR had also provided eight coaches in

November 2002 to Divisional Mechanical Engineer, Jammu (DME/JAT) and these were not yet converted into ART. In the absence of an ART at Jammu, the disasters/emergency situations had to be managed with Lukas Jacks available with DME/JAT. In NWR, two coaches converted into an ART were lying idle for two years since the zonal railway was unable to decide on the location to place the ART.

### **1.10.2.3 Other rescue and relief equipments**

The other rescue and relief equipments required to be provided for management of disasters comprised 140 tonnes break down cranes, rescue ambulances, emergency rail cum road vehicles and diesel locomotives. A review of the provision of these rescue and relief equipments across IR revealed the following deficiencies.

- The HLC suggested that there should be at least one 140 tonnes break down crane in each broad gauge division. Even though four years had lapsed since the recommendations of the HLC were accepted by the Railway Board, only 56 break down cranes of 140 tonne capacity were provided so far in all the zonal railways as against an initially planned requirement of 73 break down cranes. Additional locations for locating the cranes were identified and the requirement was revised to 84 cranes. Considering that the manufacture of 12 cranes was in progress in Jamalpur Workshop, there was still a shortage of 16 cranes. The shortage was more striking when cranes were taken off for scheduled periodical overhaul, since the area of coverage of the nearest available crane was enhanced to cover the area serviced by the crane sent for periodical overhaul.
- Instances of cranes placed at inconvenient locations leading to delays in dispatch on rescue operations also came to notice. The crane in Chennai Division was placed at Tondiarpet Diesel Shed, which had a one way exit, while the ART was placed at Tondiarpet Marshalling yard. This inevitably delayed dispatch of the ART with the crane to the accident site. A proposal to construct a platform cum roof to locate the crane along with the ART was mooted in September 2006 but there has been no progress since then. Similarly, movement of the breakdown crane at Ludhiana in Ferozpur Division of NR was restricted to one side only since the other end was used as a cycle stand. Further a covered shed constructed, in September 2006, for housing the crane was not yet operational (August 2007).
- The 140 tonne Gotwald crane was not very versatile and suffered from various operational constraints. The Chief Mechanical and Planning Engineer, CR pointed out that the crane was not suitable for use in electrified sections and that diagonal pulling, which was invariably required for removing entangled wagons/coaches, was not possible.
- Even though the steam cranes were to be phased out and replaced with 75 tonne MG cranes convertible to BG cranes of equal capacity with least inputs, the four ARTs of Samastipur Division of ECR were mounted with a steam crane of 35 tonne capacity and no action was initiated to upgrade the cranes.

- A platform that could be hooked to the crane was to be provided to assist the rescuers in their effort to extricate victims from the coaches. Hookable platforms were not provided in the cranes available in 17 divisions.<sup>7</sup>
- Nylon slings of 70 ton capacity were to be provided for the break down cranes for speeding up rescue operations. Although, the technical specifications for the nylon slings was finalised by RDSO in October 2003 itself and NR was advised by Railway Board (November 2003) to procure a sample set of nylon slings as per specifications to gain actual user experience, the exercise was still not complete and the nylon slings were not provided, thereby hampering preparedness for rescue operations.
- HLC had also recommended synthetic packing to be provided in ARTs for the cranes in lieu of the wooden packing. However, synthetic packing was not provided in 72 out of the 78 ARTs that were jointly verified.
- Divisions, where the road network was good, were required to procure a rescue ambulance and base it at the divisional hospitals, though initially one such ambulance was planned to be introduced in each zone. Feasibility of introducing an emergency rail cum road vehicle was also to be explored. Neither rescue ambulances nor emergency rail cum road vehicles were provided in any zonal railway. In its bid to minimise the cost and to incorporate rescue features in the rescue ambulance, the Ministry of Railways took two years to finalise its design. Even after the specifications for a rescue ambulance with rescue capabilities were finalised in September 2005, Central Organisation for Modernisation of Workshops (COFMOW) was yet to procure a rescue ambulance according to these specifications. As regards the rail cum road vehicle, the Ministry of Railways was still contemplating the design and the features that need to be provided in the vehicle.
- Diesel locomotives were to be provided in electrified routes, within a vicinity of 25 to 75 kilometers, to haul the relief trains in case of damage to the overhead electricity or failure of power supply. Six (CR, SCR, SER, SECR, ECR and NCR) out of the 14 zonal railways (except NWR and NFR) having electrified routes did not have a plan to locate diesel locomotives within a vicinity of 25 to 75 kilometers of each other. In ECoR, a plan was available only for Khurda Road Division only. Similarly in NR, the plan was not available for Delhi Division and in WR, the power plan was yet to be finalised for Mumbai Division to ensure availability of diesel locomotives. As such, the preparedness for haulage of relief trains in case of damage to overhead electricity or failure of power was restricted.

#### **1.10.2.4 Facilities in hospitals for the deceased**

Facilities in terms of collapsible coffins, air conditioned mortuaries and embalming gums and chemicals for preservation of the dead bodies for a reasonable time were to be provided in all the railway divisional hospitals. A

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<sup>7</sup> Ratlam, Mumbai, Chennai, Dhanbad, Danapur, Mughalsarai, Sonapur, Samastipur, Tinsukia, Alipurduar, Lumding, Katihar, Rangiya, Chakradharpur, Kharagpur, Adra and Ranchi.

review of the facilities available at the divisional hospitals revealed the following deficiencies.

- Nineteen out of the 50 divisional hospitals across IR did not have collapsible coffins while the number of collapsible coffins in nine hospitals was less than the prescribed scale of 20 coffins.
- Embalming gums and chemicals were not available in 19 out of the 50 hospitals, while only the chemicals were available in three other hospitals. In the hospitals at Chennai and Palghat in SR, Varanasi in NER and Kharagapur in SER though the embalming gums were available there was no trained staff to operate the mechanism. Traditional gravitation methods and injections were used in the absence of embalming gums.
- Eighteen out of 50 hospitals across IR did not have Air Conditioned (AC) mortuaries to preserve the dead bodies and the overall preparedness for taking care of the deceased was primitive. Further, the Air Conditioned mortuaries purchased by NWR for the divisional hospitals at Jaipur and Jodhpur were not installed and were lying idle. Similarly the AC mortuary purchased by SR for divisional hospital at Arakkonam in Chennai Division was also not installed.

#### 1.10.2.5 Facilities in trains

The HLC suggested display of guidelines in every coach to educate the passengers about the precautionary measures to be taken at the time of accidents. Further, modifications in the coach design were suggested with two roof hatches and one under floor hatch to be provided in each coach for evacuating and extricating the trapped passengers. Provisions for emergency lights were to be made in every coach. A joint inspection of trains revealed the following deficiencies.

- Roof and under floor hatches provided in two rakes of Prayagraj express were not useful as the roof exits had leakage problem while the floor exits had security and theft problems. Railway Board had since abandoned the idea of providing hatches in coaches and instead decided to have four emergency exits in coaches as against the existing two.
- Emergency automatic lights were not provided in any coach of the 87 trains out of the 95 trains checked. Even out of the eight trains, which had coaches provided with emergency automatic lights, in five trains the emergency automatic lights were provided only in nine out of the 29 coaches checked.

#### *Customer Safety facilities in AMTRAK, USA*

Customer Safety facilities during emergencies in trains run by AMTRAK, USA include:

- In the event of power failure battery power illuminates floor markings
- Chemical 'snaplights' are provided at the end of each car with instructions for operation.
- Emergency communication station is provided in the vestibule with instructions for operation.
- Instructions for using emergency provisions and exiting the trains are displayed.



- The guidelines to educate the passengers about the precautionary measures to be taken at the time of accidents were not displayed in any of the coaches in 34 trains out of the 95 trains, while in 28 trains the guidelines were displayed only in some coaches. Further in SWR, the guidelines to passengers were made out as posters, which were prone to damages/peeling off. Moreover, these were placed in inconspicuous locations in trains.

#### 1.10.2.6 Communication facilities

The HLC recommended provision of video conferencing facility from the disaster site to Railway Board and zonal railway headquarters to assist in assessment of damage, relief and assistance required at the site. Communication facility in the trains is also essential in effective real time transmission of information. A review of the communication facilities revealed the following deficiencies:

- Video conferencing mechanism was not established in any zonal railway. The Department of Telecommunications did not accord permission to use the RBGAN satellite modem to the Railways. A video conferencing facility was procured in February 2005 and commissioned in November 2005, in Mumbai Division of WR, without fully comprehending the requisite formalities and as such the system was not operational in the absence of clearance from Department of Telecommunications. As an alternative, the Ministry of Railways decided (September 2006) to provide internet facility and data communication from the site through Railways' own V-SAT hub and small V-SAT terminals in all the divisional ARTs. This facility was, however, not provided in any divisional ART (November 2007).

- The HLC also recommended a gradual upgradation of control rooms to become multi disaster resistant and fully equipped with back up systems for communication, power,

#### *Communication systems- French Railways*

Centre National Des Operations – a railway traffic management center monitors passenger, freight, operations and infrastructure over the entire country and coordinates with French Railway (SNCF).

The center communicates with customers through the national media. It controls the role of operations and responds to emergencies.

drinking water etc. sustain for a week. An upgraded multi resistant disaster control room was not available in any zonal railway. Further, in 13<sup>8</sup> out of the 31 control rooms checked in the divisions the back up facilities of communication, water or power were either not available or at least one of these facilities could only last up to two days. Further, various other deficiencies were observed in the zonal disaster control room of SCR. The satellite phone, whose antenna had to be out in the open sky for signal reception, was actually kept in a closed room. The satellite phone was fully discharged and was not being checked weekly. The zonal control room did

<sup>8</sup> Mumbai, Nagpur, Howrah, Sealdah, Asansol, Malda, Bangalore, Chakradharpur, Ranchi, Khurda Road, Bilaspur, Danapur and Samastipur.

not have vital inputs of the resources available in the adjacent zonal railways, civil authorities and other organisations, drawings of approach roads to stations etc. indicating that the preparedness was deficient.

- Radio communication in the trains was not provided in 86 out of the 95 trains checked. In some of the other trains it was seen that VHF sets were provided to communicate with the nearest station. Therefore, first hand and real time information of a disaster, which was vital in assessing the gravity of the disaster as well as to organise rescue and relief operations, could not be transmitted from the trains.

Thus, even after four years of acceptance of the recommendations of the HLC, the infrastructure provided in terms of rescue and relief equipments on the railway network, facilities in hospitals for the deceased and in trains were inadequate and the communication facilities were weak. Maintenance of the rescue and relief equipments was also deficient. The relief equipments were not strategically placed in all the divisions impeding speedy response and the entire mechanism reflecting the state of preparedness of IR was not geared up to envisaged levels.

### **Recommendations**

- *IR should augment its infrastructure of relief equipments- SPARTs, ARTs, ARMVs, break down cranes and rescue ambulances etc, facilities in hospitals and in trains to the envisaged scale.*
- *IR should initiate effective measures in maintaining the relief equipments, especially the SPARTs, ARTs and ARMVs, fully equipped and in a state of operational readiness at all times.*
- *IR should quickly provide communication system in trains and in relief trains for transmission of real time information from the disaster site, which is essential in assessing the gravity of the disaster and in organising rescue and relief. The facilities in the control rooms need to be enhanced.*
- *IR should on priority, address the issues of operational constraints imposing speed restrictions, positioning the relief trains/medical vans, cranes etc in a manner that optimises the response time, which is the essence of any response mechanism.*

#### **1.10.3 Poor coordination arrangements**

The HLC recommended entering into a Memorandum of Understanding (MoU) with the state governments so that the Railway administration could join hands for mutual assistance in case of railway or non-railway disasters. The HLC also suggested entering into MoUs with the civil and private hospitals to improve the response time, with the Armed Forces and private air operators for air support to access the disaster sites. Review, however, revealed the following deficiencies.

- Railway Board advised (August 2004) zonal railways that verbal MoUs with State Governments/ Private hospitals etc. would be adequate and that written MoUs need not be insisted upon. Consequently, divisions were not effectively pursuing the matter of entering into MoUs with the various agencies as recommended by the HLC as shown in the succeeding paragraphs. The absence of written MoUs hampered the post incidence response of IR, which has been brought out separately in para 1.11.1.2. The rationale behind Railway Board's instructions was not clear, since a written framework always has better enforceability than a loose verbal arrangement. A proper framework of eliciting co-ordination from the State Governments/Private hospitals etc is essential since IR's vast network of 63,000 route kilometers makes it impossible for IR to reach a disaster site anywhere on its network in a reasonable time without external assistance.
- Only 10<sup>9</sup> out of the 67 divisions entered into a MoU with their respective State Governments/District Authorities and the zonal headquarters of SWR had entered into a MoU for the zone as a whole. In Mumbai Division of CR, the state government officials assured (August 2003) that it would provide all assistance in case of a disaster.
- Similarly only SWR and 15<sup>10</sup> divisions of other zones entered into MoUs with civil and private hospitals.
- Only 5<sup>11</sup> out of the 67 divisions finalised an MoU with the Armed Forces/ Airport Authority or private air operators for air support.
- Further, only six out of the 67 divisions entered into a written arrangement with St. John Ambulance /Red Cross for providing the ambulance services and only three divisions (Rajkot of WR, Jabalpur of WCR and Jhansi of NCR) concluded an MoU with NGOs.

Thus, by and large, IR was unable to harness the infrastructure of the State Governments/District authorities as well as other agencies in responding to disasters and preferred to have loose co-ordination arrangements.

### **Recommendation**

*IR should enter into formal coordination arrangements with the State Governments/District authorities, civil/private hospitals and other agencies so as to effectively leverage their infrastructure while responding to disasters.*

#### **1.10.4 Inadequacy of trained manpower**

The HLC recognised that the strategy for setting up of an effective Disaster Management System depended on a well trained team of disciplined and dedicated staff. The HLC recommended periodic training for frontline staff, basic training in search and rescue for Group A officers and training ART staff to handle fire related accidents apart from the training in First Aid, which was

<sup>9</sup> Ratlam, Rajkot, Firozpur, Ajmer, Bikaner, Jaipur, Jodhpur, Bhopal, Jabalpur and Kota.

<sup>10</sup> Ratlam, Rajkot, Nagpur, Solapur, Izatnagar, Ajmer, Bikaner, Jaipur, Jodhpur, Bilaspur, Nagpur, Kota, Jhansi, Allahabad and Agra.

<sup>11</sup> Ratlam, Rajkot, Katihar, Bikaner and Jodhpur.

mandatory. A manual on post accident rescue and relief operations was also to be prepared. Review revealed that:

- Crack teams of rail rescue experts who can be rushed to any site of accident at short notice to assist the divisional efforts at the site, recommended by the HLC were not constituted. Even after four years, process of formation of crack teams had only commenced and a tender for engaging a consultant to harness global expertise was under evaluation in the Ministry of Railways.
- Similarly, the setting up of a Railway Disaster Management Institute with special focus on rescue, extrication, medical relief and restoration techniques and 'Disaster Management' modules at Bangalore in SWR, were also in the nascent stage, since a tender for engaging consultants was under evaluation.
- In most of the divisions less than 25 per cent of the frontline staff<sup>12</sup> - the first to respond in case of a disaster were trained in disaster management during the period 2004-05 to 2006-07. In NR, training programmes on disaster management were not conducted at all. While no person was trained in Bilaspur Division of SECR, in SWR, less than one per cent of the frontline staff was trained in disaster management. Moreover, the frontline staff was not properly identified in Rajkot Division of WR, while in Bhusawal Division of CR only staff of the security department was identified as frontline staff. In Pune Division of CR, frontline staff yet to be trained was not identified. Divisional hospitals of Izatnagar and Varanasi Divisions of NER could not organise training courses for front line staff of various departments as trainees were not spared for training.
- The training programmes were poorly attended. In NFR, 21 programmes on Disaster Management were cancelled due to poor participation. Three out of the eight programmes organised by the Supervisors Training Center, Bangalore in SWR, during the two years 2005-06 and 2006-07 were similarly cancelled. Two programmes were cancelled during 2004 in SCR and no one participated in the only programme organised by ECR in 2006-07. In SR, 158 out of the 600 RPF personnel nominated to undergo training at Training College, Kimber Garden, Tiruchchirapalli during 2003-04 did not attend the training.
- Even basic training in First Aid was imparted to less than 25 per cent of the frontline staff in most of the divisions. In SER, training in First Aid was given to only six persons during the three years 2004-05 to 2006-07.
- Refresher courses were also not monitored properly. In SER, the staff nominated to refresher courses were not imparted the initial training itself.
- Training of the ART staff in fire related disasters was not very comprehensive. The ART staff in some divisions was not trained in handling fire related disasters.

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<sup>12</sup> Front line staff include the Travelling Ticket Examiner, TXR, staff of Railway Protection Force (RPF), AC attendants, Permanent Way Inspectors, Safaiwalas, Guards, Drivers / Asst.Drivers, Gangmen, gatemen etc.

- Films on disaster management covering various types of accidents/disasters were not prepared and given to all the divisions.
- Basic training in search and rescue to the specialised teams of Group A officers in consultation with NDMA did not commence since the teams were yet to be constituted by the NDMA.
- Joint inspection of running trains across IR revealed that:
  - Only 150 out of the 1349 frontline staff were found to have the booklet containing Dos and Don'ts in case of a disaster.
  - The pantry car staff and AC coach attendants of the private contractors in the trains inspected on WR, CR and SR were not trained in first-aid and were not aware of the procedure of handling disasters. Even though HLC had recommended that private operators connected with frontline services should certify that their onboard staff is trained in First aid and is conversant with other medical techniques, no such condition was incorporated in the contracts entered into by SWR.
  - The First Aid boxes in 2622 Tamilnadu express did not contain medicines and those verified in the trains over SCR did not contain the adhesive bandages. Similarly, in SCR augmented First Aid boxes were not available in the long distance trains (Venkatadri, Rajkot and Hussain Sagar express trains).

Thus, training- a vital tool to hone the skills of staff- did not receive requisite importance in IR. The pace at which the frontline staff was trained and poor participation in specialised training programmes suggested that IR were not serious about developing the skills of staff to deal with medical and other emergencies that arise in disasters.

### **Recommendations**

*IR needs to constitute dedicated teams and initiate tangible measures to quicken the pace of providing specialised training in order to develop a trained team to handle any disaster. IR should also effectively harness the services of private contractors on board the trains to augment its preparedness.*

#### **1.10.5 Inadequate monitoring mechanism**

Monitoring the system is a vital mechanism for ascertaining the actual functioning of the system and to rectify the aberrations if any. The HLC recommended that each division should conduct one full scale disaster management exercise in a year. A review of records regarding the full scale disaster management exercise and mock drills for the previous two years 2005-06 and 2006-07 revealed the following deficiencies.

- Only Metro Railway Kolkata and 17<sup>13</sup> out of the 67 divisions across IR carried out the full scale disaster management exercise in both the years,

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<sup>13</sup> Bhavnagar, Chennai, Palghat, Tiruchchirapalli, Madurai, Trivandrum, Solapur, Bangalore, Lucknow, Izatnagar, Adra, Bikaner, Raipur, Nagpur, Bhopal, Jhansi, Allahabad and Metro Railway Kolkata.

while another 11 divisions carried out the exercise once in the two year period.

- The deficiencies observed were mainly related to delayed departure of the ART/ARMV and SPART. In some cases, the response of staff was sloppy. The lack of seriousness was evident when one full scale drill carried out on 24<sup>th</sup> June 2006 with ART Madurai between Tirupparamkundram and Tirumangalam sections of SR, was not treated as a mock drill by the Chief Safety Officer commenting that the exercise was not sufficient to check the alertness of all staff involved in disaster management.
- In WR, the manual operation of point at Udhana led to regular delays ranging from 5 minutes to 45 minutes in departure of ART for site of accident. This deficiency was brought out in trail runs but no remedial action was taken. In SCR also the various deficiencies observed in the mock drills conducted earlier in Vijayawada, Kazipet, Rajahmundry and Bitragunta such as non provision of double entry for the ART/ARMV siding, breakdown staff not allotted residential quarters at one place etc., were not yet rectified.

Thus, IR was lax in not ensuring that the full scale disaster management exercise was scrupulously conducted and deficiencies noticed in the mock drill rectified by all divisions.

### **Recommendation**

*IR needs to actively promote the practice of conducting the full scale disaster management exercise periodically as a means of obtaining a realistic appraisal of its preparedness to counter any disaster.*

#### **1.11 Post incidence response**

Post incidence response encompasses provision of immediate relief and rescue, minimising dislocation and early restoration of rail traffic. The effectiveness of capacity building and emergency preparedness is, therefore, borne out by the quality of the post incidence response.

The HLC termed the first hour after an accident as the 'Golden Hour' recognising that (i) most of the trauma patients could be saved if bleeding was effectively stopped and blood pressure restored within one hour (ii) victims remaining in a state of shock for long duration would die and therefore surgical intervention in the first hour was crucial for increasing the patients' chances of survival. The HLC laid down five basic steps for quick and effective rescue and relief operations

- (i) Rapid access to the site of the accident
- (ii) Quick extrication of victims and effective on-site medical management
- (iii) Stabilisation of condition
- (iv) Expeditious extraction and shifting of rescue vehicles and
- (v) Speedy transportation to hospital.

IR handles all disasters affecting trains as per the Accident Manual, which, among others, laid down the norms for departure of the relief trains to the

disaster sites. Review of 205 accidents that occurred over the previous five years across IR revealed that response to disasters within the golden hour was ineffective, preparedness and expertise was lacking apart from other deficiencies as brought out in paragraphs 1.11.1 to 1.11.3.

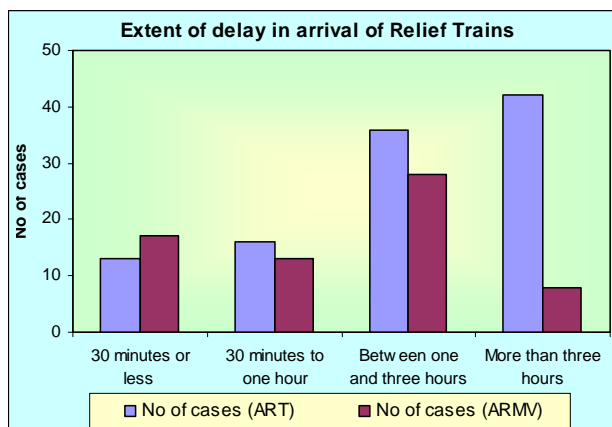
**1.11.1 Ineffective response within golden hour**

Rapid access to the accident site was the fundamental step in providing quick and effective rescue and relief operations within the golden hour. IR was not only unable to rapidly access the disaster sites for providing effective rescue and relief, but the coordination arrangements with the civic authorities/ private hospitals etc., also were very weak as shown below:

**1.11.1.1 Delayed arrival of rescue and relief equipments**

The Accident Manual stipulates that ARMVs and ARTs should depart for the accident site within 30 minutes and 45 minutes of ordering (60 minutes during night time) respectively. A review revealed that:

- The time required for ordering and movement of the ARTs/ARMVs together with the requisite time to travel the distance to the disaster site invariably took the response time beyond the golden hour. Out of the 138 incidents that



warranted either an ART or an ARMV for rescue and relief, in 124 cases the ART/ARMV the site after the golden hour. The assistance provided by IR during the golden hour was thus more by default than by design. For instance, in an accident involving a truck and train no 9304 Bhopal–Indore Intercity express at Ujjain station in Ratlam Division of WR on 27 June 2004, the ART ordered at 20:30 hours, departed only at 21:54 hours and took 48 minutes to reach the site, which was only six and a half kilometers away. Even during the bomb blasts in seven local trains that took place on 11 July 2006, in Mumbai suburban section of Mumbai Central Division of WR the ARMVs located at Mumbai Central, Valsad and Udhana were ordered but before arrival of the ARMVs, the victims at all the locations had already been shifted to nearby hospitals by the volunteers from amongst the passengers and medical relief was not required to be done by the ARMVs. Due to non-availability of diesel locomotive in the vicinity of 75 Kilometers on Mumbai Division, ARMV capable of running at a speed of 100 Kilometers per hour had to be hauled with WDS 4 locomotive with a speed capacity of 45 Kilometers per hour only.

- In 14 out of the 138 incidents, the ordering of the ART/ARMV itself was delayed. In ECR, when the train no 619 collided with a goods train on 9 November 2005, the Accident Relief Medical Equipment (ARME) was called for almost an hour after the collision. The Commissioner of Railway Safety (CRS) observed that ARME should be immediately ordered in case of passenger train accidents. Similarly in NR, ART/ARMV was not called in an accident involving train no 5273, Satyagraha express, which collided with loader of JCV machine at Jahanighera halt station on 10 April 2006.
- Delay in arrival of relief trains and equipments also delayed restoration work in 78 out of the 109 incidents that required restoration. For instance, after a mob wrecked the 2124 Deccan Queen express and two other suburban trains on 30 November 2006 in CR, the diesel light engine, that was requisitioned, took one hour and ten minutes to reach the site, while a slow local train would have taken 12 minutes to travel the distance. As a result the rescue work was delayed and in the meantime 133 suburban trains and two mail trains were cancelled. In another case of derailment of Marusagar express on 8 November 2003 in CR, an ARMV was sent back as no injuries were incurred, without realising that the ARMV was carrying the rerailling equipment required for restoration work. A separate ART was subsequently called for and the rerailling work that could have commenced by 11:00 hours, actually commenced at 16:00 hours leading to cancellation of nine trains, diversion of six trains and rescheduling of four trains.



ART Kurla carrying hydraulic rerailling equipment

#### **1.11.1.2 Poor coordination arrangements**

Lack of proper co-ordination was evident in the post incidence response to various disasters as Railways could not harness the infrastructure and support of the civic/ private agencies in 46 out of the 94 incidents that required external support. Some of the instances are detailed below.

- In the absence of an MoU, the private hospitals refused medical help in the bomb blasts that took place on 11 July 2006 in the Mumbai suburban section and consequently WR was left to face court cases, claims and criticism.
- In a major accident where 2301 Rajdhani express derailed and fell on river bank on 9 September 2002 in ER, the injured were taken to Howrah by train. Enquiring into the incident the CRS observed that the Railways could have hired helicopters/planes to move them to hospitals.
- In SCR, when the Delta Fast Passenger derailed on 29 October 2005 and fell into a water body flowing underneath the bridge, the assistance of an



Air Force helicopter, naval divers, army battalion, boats and trained personnel were sought for. While the Air Force helicopter reached the site six hours after it was requisitioned, the boats and trained personnel reached after five hours by which time all the victims were extricated and those surviving were sent to nearby hospitals. The naval divers from Visakhapatnam arrived at 14:30 hours the next day (34 hours after the disaster).

- Even when train no 2124 Deccan Queen express and two other suburban trains were wrecked by a violent mob on 30 November 2006 at 10:22 hours in CR, fire extinguishers were called at 11:30 hours and two fire tenders reached only by 13:00 hours, by which time most of the coaches were gutted by the fire. Even though the damages to railway property were Rs.2.29 crore, the CRS did not conduct an enquiry even though a statutory enquiry was obligatory in all cases where the loss exceeded Rs.25 lakh.

Thus, IR was neither able to rapidly access the disaster sites nor could they provide organised rescue and relief through effective co-ordinated arrangements with civil /other agencies. Providing rescue and relief during the 'Golden hour' was the exception rather than the rule. Delayed arrival of relief equipments at the disaster sites also led to delayed restoration of rail traffic, causing diversions and cancellation of trains.

### **Recommendations**

*IR needs to improve their response time in order to provide effective post incidence response to disasters. Co-ordination with private agencies/NGOs and harnessing the infrastructure of the district authorities are vital in promptly responding to disasters. IR also needs to effectively monitor the movement of relief equipments so as to ensure their timely availability at the disaster sites.*

#### **1.11.2 Lack of preparedness and expertise**

Preparedness to handle any type of disaster is essential for providing an effective post incidence response. Railways' lack of preparedness and expertise in handling water related disasters was apparent in the IRs post incidence response. Out of the four disasters where trains were either stranded in floods or capsized in water bodies, IR was unable to provide timely rescue and relief. Some of the instances as detailed below:

- During the floods that hit Vadodara Division of WR in June 2005 air/ boat support was not provided. The passengers of Shanti Express train were stranded and the train was detained for 48 hours leading to complaints of inadequate arrangements for eatables, water, medicines and communication facilities to stranded passengers at stations and in trains.
- During the floods that engulfed Mumbai and its suburban areas on 26 July 2005, passengers were marooned in trains in the suburban section of CR. No relief was provided to the passengers until the next day when the first train service started between Mumbai CST station and Dadar at 12.45 hrs. Additionally, the floods damaged railway property worth Rs.72.92 crore. The CRS did not conduct the mandatory enquiry. As such, there was no

scope for addressing the weaknesses in the system in handling such disasters.

- In the derailment of train no 415 Delta Fast Passenger at 04:22 hours on 29 October 2005 between block stations Ramannapet -Valigonda at a bridge on SCR, where the train fell into a water flowing underneath the bridge, the rescue team could not maneuver the velocity of the flowing water and though the ARMV from Secunderabad reached the site by 6:50 hours, the



The capsized Delta fast passenger train in Valigonda

rescue work could commence only at 09:30 hours, after the water level receded, with the assistance of the local villagers. The passengers from other coaches helped those in the affected coaches to come out.

Thus, IR lacked the preparedness and the expertise in dealing with water related disasters.

### **Recommendation**

*IR needs to enhance their state of preparedness in handling disasters involving water bodies.*

#### **1.11.3 Other deficiencies**

Various other deficiencies in the rescue and relief operations came to the fore, which are as follows:

- Neither diesel nor electric locomotives were kept on call for ARMVs or ARTs and in the event of an accident; ART/ARMVs were hauled using the nearest running train.
- The performance of SPARTs, while responding to accidents was not very encouraging. In two accidents (i) collision of a tipper lorry with train no 3351 Dhanbad/Tata –Alleppey express on 27 April 2007 between Attipattu Pudunagar – Ennore stations in SR and (ii) Unmanned level crossing accident on 16 April 2007 between Kanchipuram and Thirumalpur in SR, the SPART located at Chennai was hauled with a locomotive since the self propelling mechanism was not functioning, defeating the very purpose of providing such specialised equipments.
- Poor communication system and faulty communication equipment hampered rescue work and effective transmission of information. The information about an accident was communicated by the Guard of the train to the nearest station master using the mobile phone of a passenger. Similarly, the Guard of train no 5273 Satyagraha express could not use the portable communication phone provided to him, when the train collided with a loader of a JCV machine on 10 April 2006 at Jahanighera station on NR.

- Timely recovery of the affected coaches/wagons from the disaster site is essential for considering possible reuse of these coaches/wagons after carrying out necessary repairs. A test check revealed that on ECR alone there were 85 wagons and one passenger coach lying at the accident sites as at the end of the year 2006-07, out of which 47 wagons and one passenger coach were lying for more than six months.
- As many as 233 compensation claims were pending in three zonal railways (ER, NR and ECR) out of which 219 cases pertained to NR. All these cases were pending in the Railway Claims Tribunals at Delhi, Ghaziabad, Chandigarh and Lucknow due to non completion of departmental enquiries/investigations. The pending claims even related to accidents that occurred as far back as December 1999.
- Railway Board was yet to prepare a comprehensive accident claim compensation booklet, which was recommended by the HLC to be given on complimentary basis to the victims. Zonal publications were available in only six (ER, NR, SR, SWR, ECR and NCR) out of 16 zonal railways.

Thus, poor and inadequate infrastructure coupled with delays in the various facets of post incidence response restricted the IR's capability to effectively handle disasters.

### **Recommendations**

*IR should ensure that appropriate infrastructure was available and maintained in good fettle. Recovery of the coaches/wagons affected by disasters and settling compensation claims of victims should be carried out in a specified time frame.*

## **1.12 Safety and security issues**

Safety and security measures are all pervasive in the functioning of IR. Increasing traffic density, large number of passengers on board and the higher operational speeds of trains pose an attendant risk of accidents/disasters to its customers. Prevention and mitigation of disasters depend to a large extent on the safety and security measures in place. It is thus imperative that Railways accord importance to the safety and security issues. Audit assessed the safety and security initiatives of IR and the findings are given in the following two sections.

- Safety issues
- Security issues

### **1.12.1 Safety issues**

In its Corporate Safety plan formulated in August 2003 IR identified that most of the accidents with disastrous consequences occur due to collisions,

#### ***Railway Strategic Safety Plan in Britain***

The Railway Strategic Safety Plan (2007-2009) for Britain's mainline rail network is based on a Safety Risk Model that predicts the risk of total fatalities per year. Key risk areas to the passengers, workforce and the public – road users at level crossings are accordingly identified based on which commitments are made and targets are projected.

The aim is to move towards developing a Strategic Safety Plan that would project percentage reduction in risk that is expected from each set of actions in each key risk area.

derailments, fire accidents, accidents at level crossings and distressed bridges. Corporate Safety plan envisaged renewal and replacement of overaged assets-tracks, rolling stock and bridges, modernisation of signal and telecommunication and monitoring the human element to enhance safety. Audit, however, observed that timely renewals and replacements of assets were not carried out, provision of safety aids and monitoring of other infrastructure was inadequate compromising on safety as brought out below:

#### **1.12.1.1 Delayed renewal and replacement of assets**

Assets comprise railway tracks (Permanent Way), rolling stock (coaches, wagons, diesel and electric locomotives) and bridges. Audit observed that track renewals, replacement of rolling stock and rehabilitation of distressed bridges were not carried out in a timely manner.

- Special Railway Safety Fund (SRSF) was set up in 2001-02 with a corpus of Rs.17,000 crore to wipe out the arrears of replacements and renewals of overaged railway assets within a fixed time frame of six years. In spite of Railways utilising Rs.14,920.88 crore as at the end of March 2007 and planning works of Rs.1,882 crore out of this fund during 2007-08 arrears of track renewal works, rehabilitation of bridges and overaged locomotives continued to exist as shown in the succeeding paragraphs.
- While in service, the track is subjected to fatigue, wear and tear. For continued ability of the track to withstand the expected traffic, it is required to be renewed periodically. Track renewals involve replacement of existing rails and/or the sleepers. However, as pointed out previously in Chapter 3 of the Report of the Comptroller and Auditor General of India (Union Government Railways) 2007 (Report No. 6-Performance Audit), while only 56 per cent of track renewal works projected by the zonal railways were finally sanctioned by Railway Board, even the works sanctioned were not completed within the stipulated time. As many as 1,416 works, comprising 556 works under SRSF,<sup>14</sup> were outstanding out of which 569 works, comprising 258 works under SRSF,<sup>15</sup> were taken up more than five years ago.
- One of the aims of the Corporate Safety Plan was to replace the existing system of assessment of bridges with a modernised inspection and assessment system for evaluation of the strength and residual life of the bridges. As on date, out of 1,27,768 bridges, while 42 per cent of the bridges were stated to be more than 100 years old and 62 per cent of the bridges were more than 80 years old. However, even after a lapse of four years of formulation of the Corporate Safety plan, Railways have only awarded contracts for pilot projects to carry out (i) Under Water Inspection of bridges (ii) Capacity assessment and condition monitoring of bridges (iii) Fatigue testing and residual life analyses (iv) Non destructive testing of bridges etc. In the meantime, freight loading in excess of the carrying

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<sup>14</sup> 556 works under SRSF (Green book 2006-07) and 860 works under DRF (Pink Book 2005-06)

<sup>15</sup> 258 works under SRSF and 311 works under DRF.

capacity was permitted on some selected routes, which meant that the capacities of the bridges need to be strengthened on priority.

- Twenty four bridges out of the 136 bridges that were declared as distressed by Railways up to 2004-05 were not even planned for repair/rehabilitation. Out of the 110 bridges that were planned for rehabilitation during 2005-06 and 2006-07, works on as many as 39 bridges were not completed (November 2007).
- Modern bridge testing laboratories with some non-destructive testing equipment, which were to be provided in all the zonal railways have not been provided in any zonal railway.
- The rolling stock comprising of coaches, diesel and electric locomotives was overaged. As many as 321 out of the 4,500 diesel locomotives, 61 out of the 3,197 electric locomotives and 1,229 of 42,160 coaches had outlived their stipulated lives requiring replacement. Diesel and electric locomotives and coaches were overaged to the tune of 216 months, 108 months and 588 months respectively.

#### **1.12.1.2 Inadequate provision of safety aids**

Safety aids play a crucial role in prevention of disasters such as collisions and accidents at level crossings. Corporate Safety Plan envisaged installation of modern devices and warning systems to prevent collisions, modernisation of signalling system and maintenance of signalling equipment. Audit observed that safety aids were yet to be comprehensively provided as brought out below:

- The Corporate Safety Plan envisaged provision of Anti Collision Device (ACD) for comprehensive safety coverage to eliminate collisions and consequent fatalities. This device provided in the trains, stations and level crossing gates assists in detecting train partings and provides audible and visual warnings at level crossing gates when trains approach them. Even after four years of finalisation of the Corporate Safety Plan, IR was yet to implement the ACD. The pilot project is still in progress in NFR (November 2007).
- Track circuiting is one of the most important safety aids to be provided at all stations to reduce collisions in station area. Track circuiting eliminates the chance of reception of trains on the occupied lines at stations. Full track circuiting was not implemented in as many as 1,784 out of 6,211 signalling stations in 67 divisions across IR.
- Axle counters are electronic devices employed for detecting the presence of a vehicle on a block section i.e., the section of a track between two adjacent stations. This is a critical device that detects presence of parted load (bogies and wagons) that get disconnected from the running trains and remain dangerously on the track. Tracks used even for 'A' class routes, on which super fast trains are operated, did not have the facility of block proving (process of proving that there are no vehicles in the entire block section) by axle counters.

- Train Actuated Warning Devices (TAWDs) are provided at unmanned level crossings to warn about an approaching train and to prevent accidents at unmanned level crossings. There were as many as 18,976 unmanned level crossings in all the 67 divisions; and even though accidents at level crossings were identified as a serious concern, only 43 unmanned level crossings in seven divisions<sup>16</sup> were provided with TAWDs.
- Modernisation of points and signals through Panel Interlocking (PI), Route Relay Interlocking (RRI), and Solid State Interlocking (SSI) were not completed. Out of 6,211 signalling stations only 2,959, 288 and 164 stations respectively were provided with PI, RRI and SSI.
- Numerous instances of signal gear failures were noticed across all zonal railways. For the year 2006-07 alone 2,08,966 failures in signal gears were reported across IR, with Bilaspur Division of SECR, Howrah Division of ER, Lucknow, Delhi and Moradabad Divisions of NR accounting for the maximum with 19,357, 12,705, 12,051, 10,778 and 10,003 failures respectively.
- Auxiliary Warning System (AWS) eliminates human error in passing signals at danger. Even though AWS was working satisfactorily in the Mumbai suburban sections of CR and WR, the system was not implemented in any route across IR.

### **1.12.1.3 Inadequate monitoring of other infrastructure**

Railways were not monitoring the other infrastructure directly related to safety as brought out below:

- Excessive use of line capacity of the track has its adverse impact on safe operation of trains. A test check on some zonal railways indicated that in 91 sections over five zonal railways (WR, ER, SCR, SWR and NFR) the line utilization was far beyond its chartered capacity and the sections were oversaturated. In SCR, 49 sections over five divisions were oversaturated with the actual line utilisation up to 173 per cent of the chartered capacity. Over utilisation results in non-availability of time for effective maintenance and thus constitutes a safety hazard.
- Monitoring of human element was also deficient. A large number of vacancies existed in the cadre of drivers/motormen in most of the divisions. Except for three divisions (Bhavnagar of WR, Guntur of SCR and Rangiya of NFR) which had manpower slightly in excess of the sanctioned strength, as many as 8,493 vacancies existed in the driver/motormen cadre in 62 out of the 67 divisions across IR as at the end of March 2007. This inevitably led to a situation where the drivers increasingly performed overtime duties beyond their prescribed duty of ten hours and were prone to fatigue and neglect, which is not in the interest of safety.

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<sup>16</sup> Vadodara (1), Tiruchchirapalli (4), Delhi (14), Hyderabad (10), Bangalore (4), Bikaner (8) and Jodhpur (2).

- The Corporate Safety Plan envisaged induction of fire proof coaches and introduction of technological inputs to prevent and minimise fire accidents and its fatalities. The fire proof coaches have not yet been manufactured by the Integral Coach Factory, Perambur. Even though the use of fire retardant materials was planned for coach flooring, roof ceiling, seats and berths, seat upholstery and curtains in the coaches, fire retardant materials such as compreg boards and asbestos free limpet sheets were used only for coach flooring and roof ceiling, which was inadequate in mitigating the consequences of fire.
- The Disaster Management Act, 2005 stipulates that every ministry and department should allocate funds for measures for prevention of disaster, capacity building and preparedness. However, Railways did not allocate a separate head of account for booking the expenditure incurred on disaster management. Zonal railways allotted funds through regular budget plan and booked the expenditure to concerned revenue / capital heads. Several departments were incurring expenditure on various aspects of disaster management and all the zonal railways differed in their approach of booking the expenditure on disaster management. Consequently, the total expenditure on disaster management was a diffused entity, which could not be tracked.
- After a serious accident in CR and based on recommendation of CRS the facility of artificial ventilation with exhaust/jet fans was installed in tunnel number 25C in Karjat-Lonavla section at a cost of Rs.1.79 crore. The system remained non- functional for long periods of time from January 2004 and May 2005 and from August 2006 till date (November 2007), indicating that the infrastructure specifically provided for prevention and mitigation of disasters was not properly maintained.

Thus, assets were not renewed or rehabilitated in a timely manner. Safety aids were not provided and safety related infrastructure including manpower was not effectively monitored. The safety measures initiated for prevention and mitigation of disasters were inadequate.

### **Recommendation**

*IR needs to ensure that assets are promptly replaced and rehabilitated, safety aids are adequately provided and manpower and other infrastructure are effectively monitored to enhance safety of trains.*

#### **1.12.2 Security issues**

Protection of railway assets and property was the responsibility of the personnel of the Railway Protection Force. The Commercial staff also man the entry points in stations to prevent unauthorised entry into the station premises. As already pointed out in Chapter-II of the Report of the Comptroller and Auditor General of India (Union Government Railways) Report no 6 (Performance Audit) of 2007, overcrowding in station premises was an aspect of major concern and it is imperative that IR assess the threat perception at all stations and initiate measures towards enhancing security at stations. A joint inspection of the security mechanism at 138 stations across IR revealed that

the infrastructure was inadequate and the surveillance at stations was not very effective as brought out below:

- CCTV's were not available in 87 out of the 128 stations belonging to the 'A' 'B' and 'C' category stations, which handle the maximum amount of the passenger traffic.
- In 10 out of the 24 'A' category stations, some units of the CCTV mechanism were not functioning, which included major 'A' category stations such as Chennai Central, Kalyan, Secunderabad, Guwahati and Patna Junction. In Patna, only 10 out of the 53 CCTV units were functional. In addition, in Mumbai CST station - an important 'A' category station, the RPF personnel were unaware of the CCTV operations. In Nagpur, even though walkie talkie instruments were provided to facilitate communication between the RPF personnel monitoring the CCTV and other RPF staff deployed in the station premises, none of the 16 walkie talkie instruments provided were functioning, limiting the utility of CCTV's. In Vijayawada, no RPF personnel were posted to monitor the CCTV's, defeating the very purpose of their provision.
- Only four stations (Jammu Tawi, Samastipur, Darbhanga and Patna) out of the 62 'A' category stations were equipped with scanning machines. Even out of these, the scanning machines provided at Samastipur, Darbhanga and Patna were not functional. Similarly only two stations (Moradabad and Bareilly) out of the 50 'B' category stations inspected were provided with scanning machines and the scanning machine provided in Bareilly was not in working order.
- Hand held metal detectors or door frame metal detectors were provided in only 47 out of the 62 'A' category stations and in 25 out the 50 'B' category stations. Even out of these, some of the hand held metal detectors or door frame metal detectors provided in 15 'A' category and seven 'B' category stations were non-functional.
- The security mechanism in smaller stations was inadequate. None of the five 'D' category stations jointly were equipped with any surveillance mechanism.
- Bomb detection and disposal squad was available only in Chennai. In Secunderabad a bomb detection set was available but none of the staff was trained to operate the equipment.
- A majority of the stations had multi entry/exit points, which were either not manned or monitored regularly. The RPF was therefore not effective in preventing unauthorized entry into station premises.



An unmonitored entry/exit point at Bangarapet station



Thus, surveillance mechanisms were inadequate and the RPF was ineffective in preventing unauthorized entry into station premises.

**Recommendation**

*IR needs to enhance the surveillance mechanism in the stations and institute an effective mechanism to prevent unauthorised entry into station premises.*

**1.13 Conclusion**

Indian Railways had recognised that the state of preparedness required an upgradation to that of a Disaster Management System to effectively deal with disasters. Indian Railways were however, not prepared to deal with all kinds of disasters, the zonal and divisional disaster management plans lacked cohesiveness and were not comprehensive. The infrastructure was not only insufficient but was also poorly located and not maintained adequately at many places. This was borne out by the post incidence response of the Indian Railways to various disasters. Indian Railways were neither able to rapidly access the disaster sites with its rescue and relief equipments nor leverage the infrastructure of the civic/ private agencies through effective co-ordination agreements. Organised assistance provided within the golden hour was the exception than the rule. The response time of Indian Railways warranted significant improvement. The provision of safety aids and maintenance of infrastructure to enhance safety of the travelling passengers was inadequate and the measures adopted to enhance security at stations for prevention and mitigation of disasters were not commensurate with the number of passengers handled.