Chapter 1

FIRE ACCIDENTS IN PASSENGER COACHES IN INDIAN RAILWAYS

1.1 Executive Summary

In India, the Railways are the most preferred mode of transport both for the movement of people and goods consignments in bulk. Indian Railways aimed at zero tolerance to accidents through implementation of Corporate Safety Plan (CSP) (2003-13) and Indian Railways Vision 2020.

Key Findings:

- *The CSP envisaged bringing down the number of accidents by 80 per cent from 2001-02 by 2013, but number of accidents went up by 160 per cent during the above period. The loss of human lives in Fire accidents in passenger coaches steeply increased from 3 in 2001-02 to 9 in 2011-12, 32 in 2012-13 and 35 in 2013-14.*
- *The Research Designs and Standards Organisation (RDSO), the agency responsible for prescribing specifications for fire retardant materials did not have their own laboratory facilities and the proposal (2006) to create state of the art laboratory is still in nascent stage. The fire simulation software procured in 2010 at a cost of ₹1.5 crore, meant for optimisation of coach design could not be put to optimum use due to non-availability of testing facilities.*
- *There is no clear roadmap drawn by RDSO/Railway Board to match the international trends as envisaged in the XII plan document on safety. RDSO has been guided by the norms of International Union of Railways [UIC] for developing specifications for fire retardant materials. In 2006 RDSO envisaged that these specifications were only an intermediary step and ultimately fire retardant norms have to be further upgraded to the latest international norms. The present UIC norms are being phased out in major International Railway systems and being replaced with new fire safety standard EN-45545[1] which envisage testing of the coach/ assembly as a whole to see the overall impact of smoke, heat and toxic gases on passengers. However, after eight years, only the global tender to develop state of the art facilities for testing fire retardant properties was floated in February 2014.*
- *Audit noticed that RB did not enforce its instructions on shifting of junction boxes to Guard's cabin in SLRs, the removal of bottom latches of doors of passenger coaches, sufficient availability of locking arrangement*

[1] ***New fire safety standard developed by UIC to be implemented in European Railways***

for rotary switch panels in a number of coaches, non-provision of glass breaking hammers in AC coaches etc. during coach maintenance.

Joint survey conducted by Audit and Railway officials brought out the following:

- *Fire prone activities like cigarette smoking, cooking by vendors at stations, carriage of inflammable articles by unauthorised persons, accumulation of empty card board boxes and other waste materials, went unchecked, aggravating the risk of fire.*

  Besides, instances of non working of exhaust fans in non-AC pantry cars, tapping of power from fan and light through open wires to connect mobile phones, etc, food waste dumped near toilets and vestibule area, non-maintenance of boilers, electronic devices, wiring system, chimney, cooking with open flame in the pantry cars, etc, noticed during the survey indicated that these hazards which could contribute to the fire accidents were not adequately controlled.

- *As per the norms of UIC (UIC 564-2), one extinguisher in each vehicle with seated places and two extinguishers in each sleeper coach are required to be provided. Audit noticed that the fire extinguishers were placed under the seats, on the floor and inside the locked linen cabins. In SLRs, fire extinguishers were kept in a closed cupboard with one time use pad lock. In some SLRs, instead of pad locks, the doors were tied with threads which cannot be opened easily.*

- *The automatic smoke / fire detection device in the running trains are not successfully implemented. The XII Five Year Plan also stressed upon the need for induction of automatic fire alarm system in coaching trains for early detection of fire and for introduction of automatic fire detection and suppression system for power cars and pantry cars which are more vulnerable to fire accidents. Recommendations were also made by the High Level Safety Review Committee for introduction of flame detection system interfaced with Alarm Chain Pulling (ACP) equipment, in coaches which should sound hooter to warn the passengers. However, the exact date of trial and testing has not been mentioned.*

- *The loading in parcel vans was not adequately supervised to ensure booking of motor vehicles without petrol or avoidance of banned/restricted articles. The leasing agreement with private parcel operators for parcel space in brake vans did not provide for supervision of loading by railway official which is fraught with the risk of loading fire prone articles.*

- *The CSP (2003-13) observed that the maintenance staff also needed to be trained like running staff (TTE, coach attendant, catering staff etc.). Audit noticed that sizable percentage of employees have not attended training*

and mock drills and hence there is need to intensify awareness of staff through mock drills and training on fire fighting.

- *Rail users' awareness on prevention of fire accidents in trains play a significant role in reducing fire accidents in passenger trains and at railway stations. Audit assessed the level of awareness of passengers on fire safety through survey and found that regular passenger awareness programme was not conducted by RB. Moreover, fire safety stickers are also not pasted at prominent locations to reduce fire prone activities at stations and on trains. Updated list of emergency contact numbers of nearest fire station, hospital, police station, ambulance service were also not available at nine stations.*

- *Availability of fire fighting and communication facilities and preparedness of the Railway Administration is essential for timely and prompt response to fire accidents. The CSP also emphasized that Mobile Train Radio Communication (MTRC) system has an intrinsic potential in enhancing the safety and security in train operations. It was noticed by Audit that fire fighting units/fire stations maintained by respective State Governments were not available in the neighborhood of 16 stations. Further, Direct communication between loco pilot and station master through Very High Frequency (VHF) and Close User Group (CUG) was not provided at six stations of Metro Railway, Kolkata.*

- *Government of India, Ministry of Health and Family Welfare (May 2008) has issued notification for prohibition of smoking in public places as per Prohibition of Smoking in Public Places Rules 2008. This rule covers Railway premises also. However, Section 167 of Indian Railway Act 1989*[2] *was not amended prohibiting smoking in trains and railway premises and prescribing stringent punishment for violation.*

1.2 Introduction

The primary requirement of train transportation is to ensure safe, speedy, reliable and punctual movement of passengers and goods to various destinations in the country. The Corporate Safety Plan (CSP) 2003 to 2013 states the objectives, strategies and targets for which the Indian Railways (IR) would be striving and encompasses the priorities of the safety related works. CSP observed that fire accidents in trains constituted two *per cent* of total accidents and accounted for two *per cent* of total fatalities. CSP aimed at reduction in fire accidents and consequent fatalities by 80 *per cent*. IR Vision 2020 prepared in 2009 also aimed at making railway operations free of fire in

[2] ***Section 167 of Indian Railways Act 1989 stipulates that – (1) No person in any compartment of a train shall, if objected to by any other passenger in that compartment, smoke therein, (2\) Notwithstanding anything contained in sub-section (1), a railway Administration may prohibit smoking in any train or part of a train, (3) Whosoever contravenes the provisions of sub-section (1) or sub-section (2) shall be punishable with fine which may extend to one hundred rupees.***

trains by enhancing the fire worthiness of coaches and by using fire retardant materials in passenger coaches.

One of the key areas identified in the XII Plan (2012-17) was the use of furnishing materials in the coaches with superior fire retardant properties in line with international norms. The XII plan also stressed the need for induction of automatic fire alarm system in coaching trains for early detection of fire and for introduction of automatic fire detection and suppression system for power cars and pantry cars which are more vulnerable to fire accidents.

The High Level Safety Review Committee under the chairmanship of Shri Anil Kakodkar, made (2012) the following significant observations and recommendations with regard to fire accidents:

- Stopping of trains in the event of fire is an important function which should be integrated with the fire alarm system as the passengers may not be able to operate the Alarm Chain Pulling (ACP) system to stop the train. The Committee recommended introduction of flame detection system, interfaced with ACP equipment, in coaches which should sound hooter at many places in coaches to warn the passengers.
- With the existing design of emergency windows, passengers cannot jump out through them without any aid in the event of eventualities and recommended for providing a simple ladder or equivalent.
- Cooking is also dangerous in AC pantry cars as was demonstrated in the fire incident on Mumbai Rajdhani Express on 18 April 2011. Commissioner of Railway Safety (CRS) in his report has mentioned that a 'Patila'(container) filled with oil and frying spoon inside it was left on a hot plate element in the night and the staff forgot to switch it off causing major fire. It recommended strict enforcement of existing instructions prohibiting cooking in pantry cars.

IR was aiming at zero tolerance to accidents through implementation of recommendations of various committees. However, Audit observed that during the years 2011-12 to 2013-14 there were 4, 8 and 8 fire accidents in passenger coaches respectively and in five accidents alone there were 76 casualties. The number of fire accidents that happened in IR during 2001-02 was five. As per CSP, this should have been brought down by 80 *per cent* by 2013. However, it was noticed that the number of fire accidents increased to 8 during 2012-13 as well as during 2013-14. i.e. increased by160 *per cent* compared to 2001-02 . Besides, number of casualties also exceeded 30 each year in 2012-13 and 2013-14. As the objectives of CSP remained unachieved, the adequacy of the system put in place by the Indian Railways and its effectiveness was reviewed.

1.3 Audit objectives

The review of the activities relating to prevention, detection and response to fire accidents was conducted to evaluate:

- existence and effectiveness of the system for prevention of fire through procurement and utilisation of fire retardant materials meeting international specifications in the manufacture and maintenance of coaches at production units, workshops and coaching depots.
- adequacy and effectiveness of measures to prevent fire prone activities at stations/passenger trains
- efforts to mitigate the losses by effective communication, evacuation, training of staff and spreading awareness among travelling public on fire hazards

1.4 Audit criteria

Sources of audit criteria for this review:

- Corporate Safety Plan 2003-13 (Chapter V, Para No.5.3, 5.6, 5.8, 5.42, 5.43).
- Report of the High Level Safety Review Committee 2012 Para 4.6 and 4.7 (pg.57 to 59).
- Guidelines and letters issued by RDSO regarding fire safety, emergency window, automatic smoke/fire detection system.
- Guidelines and letters issued by RB on fire audit and special drives conducted by Zonal Railways (ZRs) on fire safety - 2012, 2013 and 2014.
- Indian Railway Act 1989 Section 67, 164 and 167.
- Indian Railway Catering Policy 2010, Para 9.
- Para 8 of Standard Agreement for leasing of parcel space in Brake vans.

1.5 Audit scope, methodology and sample

- The present review focuses on fire prevention, detection and control activities of IR during the three year period from 2011-12 to 2013-14. The scope of the audit extended to examination of activities related to fire prevention and detection in the manufacture of coaches in production units and electrical/ mechanical maintenance at workshops and coaching depots. The existing monitoring mechanism to prevent carriage of inflammables, smoking in trains and preparedness of Railways in timely detection and extinguishing fire and rescue operations were also studied.
- The review was conducted in 1280 coaches at 14 workshops (out of 39 workshops), 33 depots (out of 180 coaching depots), 132 stations of

different categories, joint inspection along with Railway officials in 1089 coaches, 51 pantry cars of 138 trains.

Audit examined records in Mechanical, Electrical and Commercial Departments of Zonal Railways and Production Units. Physical verification of prevalent conditions was also made at workshops/coaching depots, Railway stations and trains through joint inspections with railway officials. Further, the following surveys[3] were also conducted by Audit:

- Survey among 1007 maintenance staff at 14 workshops over 14 ZRs[4] and 33 coaching depots over all the ZRs, to assess their awareness about fire safety measures.
- Survey among 3259 passengers over 17 ZRs to assess their awareness about danger of smoking in coaches/ carriage of inflammables/explosives and how to respond to fire in trains.

The review was issued to RB on 29-January-2015. Their reply has been received 24-April-2015. RB response on Audit comments have been incorporated at appropriate places in the review.

The audit findings are discussed in the following paragraphs.

1.6 Use of fire retardant materials

The major cause for loss of life and property during fire accidents in passenger coaches is rapid spreading of fire. IR is using fire retardant furnishing materials to mitigate effects of fire and to enhance the fire worthiness of coaches since 2000.

1.6.1 Development of specifications by RDSO

Research Designs and Standards Organisation (RDSO) is the agency responsible for setting standards for the furnishing materials used in the passenger coaches. They have developed specifications for 18 fire retardant materials which included material like curtain fabric, upholstery and modular toilets with fire retardant properties. These specifications were developed and improved by using the limited laboratory facilities available with the Mechanical and Carriage Directorate. The XII plan envisaged that all the furnishing materials in the coaches should have superior fire retardant properties in line with international norms. The following points were observed in audit in respect of the development of specifications of fire retardant materials.

[3] ***Survey questionnaires issued to 25 employees in each of workshops/coaching depots test-checked and to passengers in the trains test checked.***
[4] ***No Carriage Workshops in ECR, NCR and SECR***

- RDSO has been guided by the norms of International Union of Railways [UIC] for developing specifications for fire retardant materials. These specifications have parameters like resistance to spread of flame, deterioration of visibility due to smoke, limiting oxygen and toxicity index. However, RDSO envisaged (2006) that these specifications were only an intermediary step and ultimately fire retardant norms have to be further upgraded to the latest international norms. The present UIC norms are being phased out in major European Railway systems and being replaced with new fire safety standard EN-45545[5] which envisaged testing of the coach/ assembly as a whole to see the overall impact of smoke, heat and toxic gases on passengers. RDSO mooted (2006) a proposal to develop state of the art facilities for testing fire retardant properties. In this connection, a global tender was floated in February 2014. The tenders were not finalized till July 2014. Further progress in this regard has not been communicated by RB. The delay in creation of these facilities is likely to impact the efforts of RDSO to align with global trends on specifications of fire retardant materials. Further, the delay also affected the utilization of the software 'Fire simulation with technical support and training' procured at a cost of ₹1.15 crore in March 2010 to help in design optimization of coaches and selection of combination of the materials.

  RB replied (April 2015) that the new facility would be created by September 2015.

  The XXII plan also identified the use of materials with superior fire retardant properties in line with international norms as a key area. However, in the absence of these facilities, the specifications conforming to latest norms cannot be framed and the fact that it took nine years for RB to establish the laboratory indicates that this critical area was not effectively monitored. There is a need for closely monitoring the creation of the new testing facility for testing the specifications of fire retardant materials and also to start using fire retardant materials conforming to international norms.

- GM, RCF, Kapurthala suggested (January 2013) to take corrective action against the extensive use of certain fire hazard materials like PVC, plywood, adhesives and paints (because of harmful combustion products they generate in the event of a fire) which were used in limited way in other Railway systems of the world. It was noticed in audit that these materials are still being used in IR.

  RB in their reply (April 2015) stated that these materials qualify all fire related properties including toxicity as per UIC standard. It is also stated

[5] ***New fire safety standard developed by UIC to be implemented in European Railways***

that the efforts are in hand to replace PVC and wooden panel etc. with suitable alternate material.

The reply is to be seen in the light of the fact that even after a lapse of two years since this issue was brought to the notice of RB, it is still engaged in the development of alternative materials. Hence there is need to speed up development of alternate materials to reduce fire hazards.

- RITES, the inspecting agency for fire retardant materials ensures the quality of materials supplied through the test certificates issued by the manufactures and test checking the sample materials at the manufacturer's lab facilities. In view of increased incidences of fire in passenger coaches, RITES introduced (April 2014) the practice of testing the samples collected from the suppliers at outside laboratories approved by RDSO. The revised quality assurance of fire retardant materials needs to be continued on systematic basis.

- Status of procurement and utilisation of fire retardant materials by ZRs was not monitored by RDSO. Feedback[6] on the performance of fire retardant materials, which helps in further development of fire retardant properties of furnishing materials, was not obtained periodically from ZRs and production units.

  RB replied (April 2015) that RDSO has developed a web portal for performance monitoring of the materials in 2011 and ZRs advised for regular feedback on the performance.

  The reply is not convincing. Audit has been informed by the production units and ZRs that they are not sending any feedback on the performance of fire retardant materials to RDSO. Unless and until the feedback is received, no further improvement on the fire retardant materials could be taken up. In view of this RDSO should regularly get the feedback on the performance of fire retardant materials from Production Units and ZRs.

1.6.2 Availability of fire retardant materials

The availability of these fire retardant materials for manufacture and maintenance of passenger coaches was examined and it was found that these materials were available at Production units and workshops. However, the units were facing difficulty in getting supplies due to inadequate approved sources of supply as explained below:

- RDSO has developed only two to four sources for supply of fire retardant materials like Curtain fabric (2), NFTC sheets for roof paneling (4), pre-laminated shaded compreg sheets (2-partII), upholstery and densified thermal bonded polyester blocks (4-part II)

[6] ***RDSO letter No.QAM/Vendor Policy dated 08/10/2010.***

for use in coach seats. Due to limited sources of approved suppliers, ICF was facing difficulty in getting material in time.

- In the workshops (ECoR, SR, SER, WCR, NFR, NWR, WR, NR) the supply of fire retardant materials like PVC upholstery/PVC flooring sheets, Vane relay & Wood based compreg, stain proof fire retardant upholstery cloth was not adequate, Due to non-availability of materials, coaches with slightly worn out rexine/vinyl flooring were allowed to form part of running trains resulting in ineffective maintenance.

Thus, Audit observed that adequate fire retardant materials were not available at some of the production units and workshops to ensure effective maintenance.

RB replied (April 2015) that they were developing more sources by floating expression of interest on regular basis.

However, the fact remained that the number of suppliers for these critical materials is still limited. Hence RB should take expeditious action to develop more suppliers.

1.6.3 Design and development

The CSP observed that the goals of new technologies were to improve safety through reduced human dependence and improved asset reliability at reduced costs. Coaches are required to be designed in such a way as to ensure adequate safeguards for prevention, detection and response to fire accidents in passenger trains. Further, designing appropriate system of fire barriers, fire suppression, smoke detection, raising alarm, automatic emergency braking and emergency exit windows are essential to prevent, detect, extinguish and respond to fire.

Audit noticed that the Integral Coach Factory (ICF) developed[7] a new design of cabin doors which could be opened to both inside and outside as against the present design where door opens only inside making it difficult for evacuation of passengers in the event of accident. As a trial measure, these doors were introduced (August 2014) in five AC coaches over four ZRs (SWR, NER, WCR & CR-2).

Audit observed that in the following instances there was delay in accepting the proposals for design changes by RB:

- RDSO prepared (2010) drawings for fire retardant coated stainless steel (SS) paneling which could be used in gangways and doorways.

[7] ***ICF letter No.MD/Fur./W&D/98 dated 04/08/2014***

RB replied (April 2015) that ICF has turned out three coaches with SS paneling as a trial measure and is planning to provide this in 100 coaches in 2015-16.

The original drawing was finalized in 2010 and after a lapse of five years, RB stated that they are planning to provide this in 100 coaches in 2015-16 on trial basis. If this system was introduced earlier, i.e. within one/ two years of finalization of the drawings, then its shortcomings could have been made good and further improvements achieved by this time. Hence RB should prepare detailed time bound action plan to provide this feature in all coaches and also ensure that the target of 100 coaches is achieved by 2015-16.

- International Union of Railways (UIC) specification envisaged fire barriers of 15 minutes at the end of the coaches and 'shutting down of fans coupled with emergency brake on detection of smoke' and RDSO sent the proposal in this regard to RB in 2010.

RB stated (April 2015) that all LHB[8] coaches having vestibule are provided with fire barriers around auto closing vestibule doors to restrict spread of fire from one coach to another.

The above reply is to be seen in the light of the fact that LHB coaches running in IR were few compared to non-LHB coaches. As the feature of auto closing of vestibule doors would effectively prevent the spread of fire, RB should extend this feature to all non LHB coaches with a time bound action plan.

- RDSO proposed (August 2008) to RB to develop fire suppression system for use in coaches. Though, a contract was awarded (January 2009) to a private firm to develop the system, trials on the system were not completed. RB again directed (Dec 2012) to submit estimate for developing the system and to conduct trial on a condemned pantry car. The system was yet to be developed and tested (September 2014).

  RB replied (April 2015) that automatic fire and smoke detection system integrated with automatic application of brakes in case of fire has been successfully tried out by RDSO and provided in Jammu Tawi Rajdhani Express.

  The proposal made in 2008 by RDSO for providing automatic fire and smoke detection system was still on trial and hence indicates laxity on the part of RB to bring design changes that would effectively prevent fire. The RB should explore measures on priority basis to implement this feature in all trains.

[8] ***Linke Hofmann Busch – Hybrid coaches of German design***

IR has not made much progress in the following areas of development of fire safety measures in passenger coaches:

- RDSO advised (August 2004) all Railways and Production units (PUs) that non AC main line coaches should have two Emergency Openable Windows (EOWs) in First Class and Second Class Luggage-cum-Guard Van (SLR) and four EOWs in Second Class coaches. RDSO submitted (May 2011) a proposal to RB showing location of EOWs for non AC coaches. The High Level Safety Committee (2012) also noted that passengers could not jump out without any aid during eventuality as existing size of EOWs in non-AC coaches was not adequate. Therefore, three is a need for change in the design of EOWs.

  RB replied (April 2015) that the proposal was not approved as present norms were considered adequate.

As human life is more important irrespective of the class of journey, it is imperative that the design of the EOWs in sleeper coaches need to be reviewed to make it effective and practically usable during emergency. This has also been substantiated by CRS, in his report on the fire accident in train No.12622 Tamil Nadu Express of 30-July-2012. Hence, RB should revisit the proposal on design change of EOWs in sleeper coaches for effective and early evacuation of passengers in case of fire.

1.6.4 Maintenance of passenger coaches at workshops and coaching depots

The Railway Board instructed (January 2014) that adequate and proper maintenance of electrical appliances, junction boxes etc need to be ensured during the Periodical Overhaul (POH). Keeping PVC flooring in good condition, preventing gaps in panels, providing glass breaking hammers, ensuring joint-less wiring, shifting junction boxes from luggage area, removing unwanted bottom latches of doors, locking of switch panels are part of maintenance of coaches[9] in workshops and coaching depots. In order to avoid probable incidence of electrical short circuit inside luggage compartment of SLR, RB advised (2002) to modify the layout. Existing

Table No. 1.1
Coaches test checked at workshops and coaching depots – 1280

AC Coaches	511
Non AC Coaches	586
Metro	9
Pantry Cars	54
Power Cars	31
SLRs	89

[9] ***As per RB letter dated 05/05/2010 regarding removal of bottom latches and Annexure to RB letter No.2003/Elect.(G)/113/2 Pt. dated 30/12/2009 (locking of switch panels, sealing of fuse distribution board etc.)***

electrical switches inside the luggage compartment were to be shifted to the guard portion.

Audit conducted joint inspection of 1280 passenger coaches in various workshops, coaching depots and 1089 coaches in trains to ascertain whether aspects relating to fire safety were given due attention during maintenance of passenger coaches in workshops and coaching depots.

Audit observed that in electrical circuits of passenger coaches, fuses procured from OEMs/approved sources were used and joint less wiring to prevent short circuits and sparks were provided in coaches during maintenance in workshop and coaching depots test checked. However, Audit noticed short comings in the following areas:

Table No. 1.2 Deficiencies in maintenance

Sl. No.	Deficiencies noticed	Zonal Railways
1	Junction boxes[10] were not shifted to guard's portion in 62 out of 184 SLRs checked (in workshops, coaching depots and passenger trains) even after 13 years of issue of RB orders in (2002).	ER-15, ECR-2, NCR-2, NFR-16, NR-3, SCR-1, SER-4, SECR-9, WCR-9, WR-1
2	The bottom latches of doors of passenger coaches, which are a bottleneck in evacuating passengers during emergencies, were not removed in 63 out of 2369 coaches	NR-15, WR-4, SECR-1, CR-1, ER-6, NFR-12, NWR-24
3	The fitment, skirting and beadings inside the coaches were not maintained to avoid gaps which would allow discarded waste to penetrate behind the panels in 116 out of 1280 coaches	CR- 4, NFR-59, NWR-26, NR-5, SR-22
4	Emergency windows were not provided in 24 coaches	CR-2, NFR-3, NR-2, NWR-3, SER-2, SWR - 8, WR – 4
5	The number of emergency windows provided was less than the number specified by RDSO in 147 coaches	CR - 31, ECR - 11, ECoR - 2, NFR - 22, NR- 2, NWR - 4, SECR - 22, SCR - 2, SER - 18, SWR - 8, SR - 23, WR - 2)
6	Non provision of indication plates on the ceiling in aisle/corridor indicating the location of emergency windows as instructed by RDSO were not provided	252 (CR-13, ECoR-35, ER-6, NCR-49, NFR-45, NR-4, NWR-15, SCR-10, SECR-18, SWR-40, WR-17).
7	Glass breaking hammers were not provided in 132 coaches out of 702 AC coaches, where such hammers were required to be provided to break open the emergency window glass panel in case of emergencies.	SER-12, WCR-10, NR-3, SR-44, CR-5, ECoR-23, NWR-19, WR-4, SECR-12
8	Locking arrangement for rotary switch panels and FDBs were not available in 233 out of 1,089 coaches	CR-11, ECoR-150, NFR-7, SCR-14, SR-17, WCR-14, WR-20

[10] ***An electrical junction box is a container for electrical connections, usually intended to conceal them from sight and deter tampering.***

Thus, the RB instructions regarding fire safety during maintenance remained to be complied with in a significant number of coaches. Inadequate compliance indicates the existing system of monitoring was not effective/ inadequate.

Gaps in fitment in coaches at Coaching Depots/BBQ

RB replied (April 2015) that ZRs have been instructed (January 2014) that adequate and proper maintenance of electrical appliance etc. are part of maintenance of coaches in workshops and coaching depots.

The reply is not convincing as the instances pointed out indicate that RB instructions were not followed scrupulously. As many as 28 out of 49 fire accidents (57 *per cent*) during the period from 2011-12 to 2013-14 took place on account of short circuits which could have been avoided by strict enforcement of RB instructions on coach maintenance. Hence, RB should closely monitor the strict adherence to these instructions.

1.6.5 Measures to prevent fire prone activities at stations/passenger trains

Sections 67 and 164 of Indian Railway Act 1989 prohibit carriage of dangerous goods at railway premises and in trains. Section 167 of Indian Railway Act 1989 authorises Railway Administration to prohibit smoking in trains. Further, as per Para 7.1 of Indian Railway Catering Policy 2010, there should be no cooking on platforms at suburban stations and other stations should progressively reduce cooking on stalls and trolleys on the platforms, except for items which could be prepared through electrically operated equipment only. Para 811 (i), Chapter VIII of Indian Railway Works Manual states that it is also necessary for boundary walls to be extended right from the station outwards along with tracks of vulnerable locations within town so that outsiders do not find an easy access to the stations. As per RB instructions (2008), baggage scanners were to be provided at entry points in stations.


Remains of half burned fire wood at Chennai Central (SR)

The adequacy in enforcing of Sections 67, 164 and 167 of IR Act 1989 at 132 Railway stations and 1089 coaches of 138 trains across 17 ZRs[11] was checked through joint inspection by Audit with Railway Officials and the results are summarized below:

Table No. 1.3: Fire safety measures at Stations

Sl. No	Observation	Zonal Railways
1	Existence of Unauthorized entry points	101 stations (ECOR-7, ER-3, NER-9, NFR-6, NWR-7, SCR-8, WR-7, CR-7, ECR-2, SER-9, SWR-4, WCR-6, NCR-6, SECR-6, SR-8, NR-6).
2	Non provision of baggage scanners	105 stations (CR-4, ECOR-5, ECR-7, ER-5, NCR-7, NER-9, NFR-4, NR-7, NWR-5, SCR-8, SECR-6, SER-9, SR-7, SWR -7, WCR-6, WR-9).
3	Only one/two baggage scanners provided at stations with multiple entry points	17 (ECoR-1, ER-1, NWR-1, MR-5, SCR-1, CR-5, WCR-1, SECR-1 SR-1)
4	Only three baggage scanners	HWH(ER) having 16 entry points.
5	Only two baggage scanners	KYN (CR) having 16 entry points.
6	Sale of cigarette	Tapti Ganga Express (19045) WR
7	Eight to ten remains of burnt cigarettes in HA1 coach	Train No.18240 – Nagpur - Bilaspur Shivnath Express(WR)
8	Cooking by vendors	Manmad(CR), Kharagpur (SER), Karauta (ECR), Gonda (NER), Varanasi (NR), Ajmer, Nagaur, Phulera & Merta Road (NWR), Karauta (ECR), Chennai Central(SR).
9	Explosives(Defence Dept.) kept in open area along with other luggage	Pune station platform (CR)

Vendor selling cigarettes on Train (WR)

Cooking at platform at Gonda (NER) and vendor carrying kettle with flame at Karauta (ECR)

Audit also conducted a survey among 3259 passengers in 132 stations and 138 trains across 17 ZRs and the summarised results are as below:

[11] ***Audit conducted joint inspection of 132 Railway stations of various categories and 138 different types of trains like Rajdhani Express, Duronto, Shatabdi, Passenger coaches etc.***

- 400 (12 *per cent*) out of 3105 passengers who had expressed their opinion stated that they noticed carriage of inflammable articles by unauthorised persons.
- 902 (28 *per cent*) out of 3152 passengers who had expressed their opinion stated that they noticed sale of cigarette/beedis in Railway stations.
- 512 (19 *per cent*) out of 2647 passengers who had expressed their opinion stated that they noticed cooking in station premises.

Explosives along with other luggage at Pune (CR)

- 871 (27 *per cent*) out of 3128 passengers who had expressed their opinion stated that they had come across cases of consumption of liquor[12] by passengers in trains/ stations.

It could be seen from the above that the enforcement of Railway Act/Manual was not effective and the passenger survey also confirmed inadequate prevention of fire prone activities at stations and trains.

RB stated (April 2015) that regular drives were being conducted by Railway Protection Force (RPF) against persons involved in unauthorized activities and ZRs have been advised to keep watch on smoking.

The large number of deficiencies mentioned above point to the inadequacy of monitoring the enforcement of RB instructions on fire prone activities and carriage of inflammables at stations and trains. These activities pose a huge fire risk threatening the lives of travelling passengers and RB needs to ensure zero tolerance to such activities through adequate checks and deterrent punishment.

[12] ***Liquor is also inflammable and can cause fire in passenger coaches. In the case of fire accident in 3A of 13009 UP Howrah-Dehradun Express on 22/11/2011, it was concluded that the fire was caused by throwing of lighted cigarette butt on the floor of the coach which ignited clothes around followed by spread of fire to the curtains of the coach. The spilled over liquor already present on the floor of the coach also got ignited and aggravated the fire.***

1.6.6 Pantry Cars

IR Catering Policy (2010) states that mobile catering services were to be provided from suitably designed pantry cars fitted with state-of-the-art technology equipment in such a way as to ensure fire suppression and for progressive switch over from open flame gas burner to safer electrically powered equipment in mobile catering units. The Policy also provides for ensuring serving of pre-cooked food in Rajdhani Express trains, Duronto trains and that there should be no cooking in Shatabdi and Duronto trains. RB, from time to time, instructed ZRs to ensure proper maintenance of pantry cars and upkeep of electrical devices (such as wiring system, junction boxes, over voltage protection devices, Miniature Circuit Breakers etc.) gas manifold, refrigerators and fire extinguishers. The Railway Board instructed (September 2011 and October 2013) that pantry cars were to be checked to prevent fire in pantry cars.

Open flame cooking in Pantry Car-12779 Goa Express (SWR)-

The safety measures and maintenance of devices and equipment were checked through joint inspection by Audit alongwith Railway Officials in 51 pantry cars (29 in Express and 22 in Rajdhani/ Shatabdi/ Duronto) of 15[13] ZRs and the following instances of non-compliance with RB's instructions were noticed:

Table No. 1.4: Deficiencies in Pantry cars

Sl. No	Deficiencies noticed	No. of pantry cars
1	Cooking with open flame gas burner	30 (CR-3, EcOR-3, ECR-2, ER-3, NER-3, NFR-3, SCR-2,SER-2,SWR-2, WCR-1, WR-2, SECR-3, SR-1)
2	Cooking in pantry cars of express trains	25 (CR-3, ECoR-2, ECR-2, NER-3, NFR-3, SCR-2, SER-2, SWR-1, WCR-1, WR-2, SECR-3, NR-1) out of 29
3	Cooking in Rajdhani/ Shatabdi/ Duronto trains.	17 (CR-1, EcoR-2, ECR-1, ER-4, NFR-2, NWR-1, SCR-1, SR-1, SWR-2, WR-2) out of 22
4	Gas manifold that connect more than one gas cylinder in pantry cars not maintained in good condition	5 (CR-1, NER-1, SR-1, WR-2).
5	Gas leakage test certificates for gas companies not obtained	5 (NER-1, SWR-2, SR-1, WCR-1).

[13] ***except MR & NCR***

6	Accumulation of empty card board boxes and other waste materials	7 (CR-1, NER-3, WR-2, SR-1).
7	Exhaust fans not in working condition in non-AC pantry cars	2 (NER-1, NFR-1)
8	Tapping of power from fan and light through open wires to connect mobile phones etc.	5(CR-2, NER-3)
9	Suitable space for stocking and servicing meals not earmarked	12 (CR-1, ER-7, SWR-1, SECR-2,SR-1)
10	Food wastes dumped near toilets and vestibule area	11 (ER-2, NER-2, NFR-2, SER-1, NR-2, SR-2).
11	The maintenance and upkeep of refrigerators, boilers, electronic devices, wiring system, chimney and junction boxes not done during maintenance	14 (CR-3, NER-3, NFR-2, SER-2, SECR-3, SR-1).

The above deficiencies/ non-compliance indicated that the monitoring mechanism to prevent fire in pantry cars was not effective posing a threat of fire to the travelling public.

RB replied (April 2015) that a policy to provide precooked food to passengers and another project to enable passengers to book meals of their choice through internet/SMS has been initiated to ensure reduction in onboard cooking. It was also stated that to curb the fire hazards in pantry car, RB issued guidelines for upkeep of pantry cars.

It is apparent from the above instances pointed out in Audit that enforcement of RB instructions was weak and needed to be strengthened to eliminate these fire prone activities through surprise checks and deterrent punishment. Further, the reply does not specify the number of trains where the facilities of booking pre-cooked food was available. Hence, RB should ensure strict compliance to existing instructions till the new schemes were introduced in all trains.

1.6.7 Provision of Fire extinguishers

As per the norms of UIC (UIC 564-2), one extinguisher in each vehicle with seated places and two extinguishers in each sleeper coach are required to be provided. Though UIC norms for this purpose were not adopted by IR, RDSO stated (January 2014) that fire extinguishers – two in each air-conditioned coach, six in each power car, four in each pantry car and two in SLR were provided. RDSO has not stipulated any provision of fire extinguishers in Sleeper class, Second seating and General Compartments.

- Audit verified the statement of RDSO regarding provision and upkeep of fire extinguishers in 577 coaches and 50 pantry cars of 138 trains across 17 zonal railways and found that fire extinguishers, as stated by RDSO, were not provided in fifty coaches as given in Table below:

Table No. 1. 5 - Provision of fire extinguishers

Type of coaches	No of coaches test checked	Fire extinguisher provided	Not provided
AC coaches	440	421	19
SLR	88	76	12
Power cars	49	47	2
Pantry cars	50	47	3
Total	627	591	36

Table No. 1.6 Provision of fire extinguishers

Sl. No	Observation	Zonal Railway
1	Fire extinguishers not provided	19 AC coaches (ECoR-5, NER-1, NFR-7, SCR-2, CR-1,SER-1, NR-2) 12 SLRs (ECoR-2, NFR-6, NWR-1, WR-1, SECR-1, NR-1) 2 Power cars (NFR-2) 3 Pantry cars (NER-1, SER-2)
2	Provided one fire extinguisher instead of two	25 AC coaches (CR-1, ECoR-8, NER-2, NFR-2, NWR-10, SCR-1,SR-1) 3 SLRs (NFR -2, CR-1) 1 Pantry car(NR)
3	Provided two fire extinguishers instead of six in power cars	10 (ECoR-2, NER-2, NFR-2 SR-2, WCR-2)
4	Provided three fire extinguishers instead of six in power cars	4 (ECoR-1, NFR-2, SR-1)
5	Provided four fire extinguishers instead of six in power cars	18 (ECoR-1, NR-1, NWR-4, SER-2, SR-4, SWR-4, WR-2)
6	Fire extinguishers not placed at appropriate locations	105 Coaches (ECoR-12, ER-5, NER-7, NFR-4, SCR-5, CR-8, SWR-11, WCR-2, NCR-19, SECR-6, SR-20, NR-6) 16 Pantry cars (ECoR-4, ER-5, NER-1, NFR-4, NR-1, SR-1)
7	Instructions for use of fire extinguishers not available	375 (ECoR-64, ER-8, NER-7, NFR-25, NWR-3, MR-16, SCR-23, WR-11, CR-18, SER- 26, SWR-68, WCR- 4, NCR-31, SECR-20, SR-41, NR-10).
8	Fire extinguishers overdue for refilling	8 (SER-1, SWR-4, SR-3)

Fire extinguishers in locked condition in 2A-Train No. 22639(SR) and kept in Linen cabinet under the Caretaker's berth in 3A-Goa express (SWR)

- Audit noticed that the fire extinguishers were placed under the seats, on the floor and inside the locked linen cabins. In SLRs, fire extinguishers were kept in a closed cupboard with one time use pad lock. In some SLRs, instead of pad locks, the doors were tied with threads which cannot be opened easily. Hence, during emergency these fire extinguishers could not be easily accessed.
- High Level Safety Committee in its Report observed that, at present Railways rely on Dry Chemical Power (DCP) type portable fire extinguishers which are available for use by Railway staff during fire in coaches. The Committee felt that this type of rudimentary arrangements have generally proved to be insufficient in the event of fire accidents and only the fire brigades under the local authorities have played a major role in extinguishing fire. IR continues to use DCP type of fire extinguishers and reply (April 2015) of the RB was silent on this aspect.

The provision and maintenance of fire extinguishers in coaches is essential and deficiencies highlighted in the table are only those noticed on the 627 coaches (including pantry cars) test checked.

RB replied (April 2015) that decision has been taken to provide fire extinguishers in GS and non-AC coaches on trial basis.

The reply does not spell out any time frame for provision of fire extinguishers in all passenger coaches. Non compliance of UIC 564-2 norms in provision of fire extinguishers would expose the travelling public to enhanced fire risk and delay the dousing of fire in passenger coaches. RB should closely monitor the provision of fire extinguishers with time bound action plan.

1.6.8 Automatic fire/smoke detection system

The XII Five Year Plan stressed upon the need for induction of automatic fire alarm system in coaching trains for early detection of fire and for introduction of automatic fire detection and suppression system for power cars and pantry cars which are more vulnerable to fire accidents. Recommendations were also made by the High Level Safety Review Committee for introduction of flame detection system interfaced with ACP equipment, in coaches which should sound hooter to warn the passengers.

Audit noted that as per Railway Convention Committee's suggestion (2010), fire alarms based on smoke detection in trains were introduced in only two rakes of Train No.22823/22824 Bhubaneswar Rajdhani Express (ECoR) on a trial basis. After successful trial, implementation was to be done in 20 rakes of Rajadhani /Shatabdi Express. RDSO issued a specification in this regard in December 2012 and modified it in May 2013. However, the provision had been introduced only in two rakes of Rajdhani Express. It was also observed that though stopping of trains in the event of fire is an important function

which should be integrated with fire alarm system, automatic smoke/ fire detection devices in the running trains remain to be successfully implemented.

RB replied (April 2015) that RDSO has developed technical specification for Automatic fire and smoke detection system for AC coaches and the process of providing them is under progress and ICF has been advised to try out this system in non-AC coaches initially for trial.

RB has not specified any time frame for providing Automatic fire and smoke detection system in non-AC coaches. They have also not specified when ICF has been advised to try out this system in non-AC coaches. RB should come out with strict time frame for implementation of the system in all trains.

1.6.9 Parcel Vans

As per Para 8.1 of 'terms and conditions of agreement' for leasing of parcel space in brake vans/parcel vans, Railway staff were not required to supervise loading/ unloading of parcels at originating/destination/intermediate station. In absence of supervision, the lease holder could load any items including inflammables/banned items into the parcel vans. This also leads to compromising safety of passenger trains.

RB directed (May 2012) ZRs to conduct a special drive to check irregularities in loading of parcels in the brake vans/ parcel vans, loading of banned/ restricted articles, overloading, etc. Audit reviewed the results of periodical surprise checks of parcel vans[14] that were conducted and found as following:

- Loading of two wheelers without emptying petrol (ER, ECR, NCR, SCR, SER, SR, SWR)
- loading of parcels without leaving gap between the parcels and roof of SLR (CR, SCR, SR, SER)
- loading of motor cycles and other packages in a haphazard manner (CR, SR)
- non-working of electric lights and instances of electrical wires hanging freely in SLR (SR)
- loading of reed diffuser (inflammable article) (SWR).

In one instance, during joint inspection with Railway officials, Audit found that petrol was not emptied from a motor cycle booked for loading at Madurai Junction (SR) on 11 August 2014

The above instances indicate continued violation of RB instructions on loading of inflammable materials. Audit also noticed from the accident report that two

[14] ***As per Para 8.1 f terms and conditions of agreement for leasing of parcel space in brake vans/ parcel vans, loading/ unloading would not be supervised by railway staff. If the supervision was done by the Railway officials, cases of overloading and inflammables could have been avoided.***

fire accidents occurred in 2012 due to loading of inflammable articles in parcel van. (CR, SR).

RB replied (April 2015) that necessary instructions were issued to ZRs for corrective action.

The reply is general in nature and the instances pointed out indicate inadequacy in the system of enforcement of RB instructions. As there is no supervision of loading of parcel van by Railway staff the risk of fire due to loading of inflammable items cannot be ruled out. Hence, RB should revisit the agreement (Para 8.1 f) with the leaser of the parcel space in brake vans/ parcel vans to incorporate provision for supervision or impose stringent penalty for violation along with strengthening surprise check mechanism.

1.6.10 Training on fire safety

The CSP (2003-13) observed that the maintenance staff also needed to be trained like running staff (TTE, coach attendant, catering staff etc.).

Audit review of awareness of employees (1,007 employees) on fire prevention aspects to be kept in mind during maintenance of passenger coaches at workshop (WS) and coaching depots (CD) at various zones through survey questionnaire revealed the following:

Table No. 1.7 Survey – Maintenance staff

Sl. No	Survey question	Awareness of employees & ZRs
1	Importance of coach maintenance work carried out by them	95 *per cent*
2	The fact that any lapse in coach maintenance may lead to fire accidents in running trains	88 *per cent*
3	Not attended any training on firefighting	41 *per cent* in 13 ZRs (CR, ECoR, NCR, NER, NWR, SCR, WCR, SECR, SER, SR, MR, NR, ER
4	Not attended any awareness program on fire safety across	33 *per cent* in 16 ZRs (CR, ECoR, ER. ECR, MR, NCR, NER, NFR, NR, NWR, SCR, SECR, SR, SWR, WCR, WR)
5	Not attended any mock drill on fire fighting	47 *per cent* in 12 ZRs *(*CR, ECOR, NCR, NWR, SCR, SECR, ECR, WCR, SR, MR, NR, ER).
6	No knowledge to handle fire fighting equipment	11 per *cent* 11 ZRs (NER, ECOR, NWR, SCR, SECR, SWR, WCR, WR, SR, MR, ER).

As a sizable percentage of employees have not attended training and mock drills, there is need to intensify awareness of staff through mock drills and training on fire fighting. Non-awareness about fire risk resulting in fire accident was also reinforced by two fire accidents at Carriage workshop (SR) on 12-February-2012 and 15-February-2014 in a passenger coach. In both the

incidents the cause of fire was non removal of inflammable materials inserted in the gaps in the coaches walls before gas cutting. Awareness through training to the maintenance staff on the fire risk posed by the inflammable materials left behind in the coach would have averted the above two accidents.

- Audit checked the adequacy[15] of training imparted to station staff in prevention and control of fire at 132 stations and found that the awareness programmes and mock drills for both staff and passengers were not adequate as tabulated below:

Table No. 1.8 Survey – Station staff

Sl. No	Training/Awareness	Not conducted at Stations
1.	Fire fighting and rescue operations	6 stations (NWR-Gulabpura, SCR-Yakutpura and Bitargunta, SER-Amta, SWR-Malleswaram and Annigeri)
2.	Awareness programme for staff	64 stations (CR-9, ECR-3, ER-4, MR-4, NCR-6, NER-1, NFR-4, NR-4, NWR-6, SCR-7, SR-2, SWR-3, WCR-2, WR-9).
3.	Awareness programme for passengers	107 stations (CR-9, ECoR-7, ECR-7, ER-6, MR-5, NCR-7, NER-2, NFR-2, NR-7, NWR-7, SCR-8, SER-9, SECR-6, SR-4, SWR-5, WCR-7, WR-9)
5.	Mock drills for preparedness on fire safety at stations	114 stations (CR-9, ECoR-6, ECR-3, ER-8, MR-6, NCR-6, NER-8, NFR-6, NR-5, NWR-6, SCR-9, SECR-6, SER-8, SR-8, SWR-5, WCR-7, WR-8).

RB replied (April 2015) that necessary instructions were issued to ZRs for corrective action and fire fighting is part of the initial training curriculum of RPF staff.

The fact that six out of 49 fire accidents that occurred during 2011-13 to 2013-14 were due to human failure indicates the significance of training to maintenance staff. The reply of RB is only reiteration of their earlier instructions. Hence, RB should put in place a system to train all the maintenance staff to improve awareness on fire safety aspects.

1.6.11 Passenger Awareness Programme

Rail users' awareness on prevention of fire accidents in trains play a significant role in reducing fire accidents in passenger trains and at railway stations. Audit reviewed the level of awareness on fire safety aspects among passengers of 138 trains and in 132 stations across 17 ZRs and the efforts taken by IR in creating awareness on fire accidents among Railway passengers (3259). The results of review through physical verification and survey are given below:

[15] ***At stations, register of training are maintained and from those registers audit collected the details.***

Table No. 1.9 Training and awareness programmes

Sl. No.	Observations	No. of stations	No. of coaches in trains
1	Fire safety awareness programmes not conducted	107 (CR - 9, ECoR – 7, ECR – 7, ER - 6, M(R – 5, NCR – 7, NER – 2, NFR – 2, NR - 7, NWR – 7, SCR – 8, SER – 9, SECR – 6, SR – 4, SWR – 5, WCR – 7, WR - 9)	
2	Non-display of Fire safety stickers	88 (CR-2, ECoR-7, ECR-3, ER-3, MR-4, NCR-5, NER-4, NFR-6, NR-5, NWR-6, SCR-5, SECR-6, SER-8, SR-8, SWR-7, WCR-4, WR-5	149 coaches (CR-17, ECoR-69, ER-11, NR-4, NWR-1, SCR-2, SER-40, SR-5)
3	Clubbing of fire safety instructions with other warnings	26 (CR-6, ECR-2, ER-5, NCR-2, NER-3, NFR-1, NR-1, NWR-1, SCR-1, SER-1, WCR-3)	695 out of 948 coaches
4	Properly displayed only at 10 stations	10 (ECR-1,ER-1,NER-1,SCR-2,SECR-1,WR-4)	-

Fire safety stickers pasted in trains

Vestibule area in coach No.05106(3A)- Train No.15960 and SL coach No.14202- Train No. 12506 on 29/07/2014(NFR)

- The corridors and vestibule area were blocked with luggage, bundles of bed rolls, ice boxes, dust bin etc. hindering free movement of passengers in 65 coaches (CR-3, ECoR-9, ECR-11, ER-4, NFR-5, NR-6, NWR-7, SECR-10, SR-4, WCR-3, WR-3). In the passenger survey, 66 *per cent* of passengers were of the opinion that corridors and vestibule area were blocked with luggage, bed rolls etc.

Audit assessed the level of awareness of passengers on fire safety through survey and found that a large percentage of passengers were aware of the risk of carrying inflammables and smoking in trains and availability of emergency windows.

RB replied (April 2015) that duty list of TTE includes assisting passengers in depositing heavy luggage in the luggage booth and further stated that instructions also exist that ticket checking staff should ensure that no baggage obstruct movement of passengers to the doors and passenger could easily reach the gate. RB also stated that necessary instructions were issued to ZRs on display of fire safety stickers at stations and integrated stickers were provided near entrance of the coach.

The reply is general in nature. Although a large percentage of passengers were aware of the risk of carrying inflammables and smoking in trains, yet carriage of inflammable items and fire prone activities at stations and trains were noticed. Hence, RB should conduct passenger awareness programmes and display fire safety stickers at prominent locations to reduce fire prone activities at station and trains.

1.6.12 Preparedness of IR in detection and response to fire incident

Availability of fire fighting and communication facilities and preparedness of the Railway Administration is essential for timely and prompt response to fire accidents. As per Para 5.17 of CSP, Mobile Train Radio Communication (MTRC) system has an intrinsic potential in enhancing the safety and security in train operations.

- Fire fighting units/fire stations maintained by respective State Governments were not available in the neighborhood of 16 out of 132 stations.
- The updated list of emergency contact numbers of nearest fire station, hospital, police station, ambulance service were not available at nine out of 132 stations test checked [Yakutpura and Hi-tech city (SCR), Gulabpura (D) station (NWR), Raipur station (SECR), Bhagatanwala (NR), Phulwari Sharif (ECR), Haveri and Malleswaram (SWR), Bhopal (WCR)].
- Direct communication between loco pilot and station master through Very High Frequency (VHF) and Close User Group (CUG) was provided in all ZRs except six stations of Metro Railway (MR).

RB replied (April 2015) that necessary instructions were issued to ZRs for corrective action.

The reply is general in nature. Stations must be equipped with adequate fire fighting facilities to act immediately in the event of any fire. RB instructions on display of updated list of emergency contact numbers of hospitals; police stations etc. should be implemented.

1.6.13 Accident Relief Medical Van (ARMV)

As per Para 8.3 of CSP, ARMVs would be turned out within the stipulated time and ensuring that they get precedence over all other trains. ARMVs would be given priority in the return direction also, as they may be required at other locations too. Reliable and effective communication channels would be established at the site of accident to be in contact with divisional and zonal headquarters on arrival of ARMV at site.

Audit inspection of ARMV of 36 divisions of 16 zones (no AMRV at MR) of IR revealed that:

- Periodical trial runs[16] of 25 ARMVs (ECR-3, ER-4, NCR- 5, NFR- 3, NR-1, NWR-2, SECR-4, SER-3) were not conducted in IR.

- The position of quarterly inspection of ARMVs by Divisional Medical Officer and submission of reports is given in Table below.

Table No. 1.10 – Position of Quarterly inspection of ARMV

Quarterly Inspections conducted	Report not submitted to Chief Medical Director
All divisions of CR, ECoR, ECR, NCR, NFR, NR, NWR, SCR, SECR, SER, SR, SWR, WCR and WR and Lucknow division of NER.	Howrah and Sealdah - ER, Lumding - NFR, Jodhpur and Ajmer-NWR, Adra - SER, Agra and Allahabad - NCR, Bilaspur and Raipur-SECR and Ambala–NR

Source : Records on ARMV

- Water drums in medical relief special were not kept filled with chlorinated water in two divisions – Ratlam (WR) and Ambala (NR). There were no records to verify weekly replacement of chlorinated water in the water drums of four ARMVs at Jolarpetai (SR) Santragachi and Adra (SER) and Rajkot (WR).

- The surgical light in ARMV located at Jolerpatai (SR) was not working and the register showing the details of medicine, expiry date etc. was not periodically updated. Equipment and medicines were not replaced periodically in Merta Road (NWR).

- ARMV coach No. 8227 (NR) was under POH from November 2013.Medical items were shifted in July 2014 to another ARMV No. 6662 which was not equipped with beds, operation theatre, cabin for doctor/staff, racks for stores and water taps in bathroom/toilets.

[16] ***As per Para 706 of Indian Railway Medical Manual, monthly inspection by medial officers is to be conducted.***

- There was leakage in the roof of the three ARMVs and the water was dripping in the van during rainy season at Igatpuri (CR), Sambalpur and Bhadrakh (ECoR).
- The ARMV at Ernakulam South station (SR) was stabled at the end of Platform No.2 with single side exit which could result in loss of precious time in the event of any fire related exigency. At Hubli (SWR) and New Bongaigaon (NFR), the location of ARMVs was not easily accessible during emergency.
- Equipment provided was not sophisticated and not easy to handle during disaster/accidents at Sambalpur (ECOR).

Audit also noticed that the Inquiry Committee took serious note of not ordering ARMV by JHS division (NCR) on two fire accidents in Train No.11123 on 14-01-2013 and Rajdhani Express on 16-04-2013.

RB replied (April 2015) that the necessary instructions were issued to ZRs for corrective action.

The reply is general in nature and doesn't indicate the specific action taken on instances pointed out in Audit. In the event of any fire accidents it is the duty of the Railway Administration to provide ARMVs in the shortest possible time at the spot. Hence, RB should ensure that ARMVs are maintained properly and stabled at easily accessible locations.

1.6.14 Instances of fire accidents

Safety department of each ZR has to ensure the adequacy of safety measures for prevention of fire accidents in passenger coaches at workshops/depots, stations, trains and in pantry cars and power cars. As per Section 113 (2) of Indian Railway Act 1989, the Railway Administration within whose jurisdiction the accident occurs, as also the Railway Administration to whom the train involved in the accident belongs, shall without delay, give notice of the accident to the State Government and the Commissioner of Railway Safety.

Audit review on the fire accidents that occurred in IR during the review period revealed the following:

(i) Accidents in passenger coaches reported as 'Fire accidents'

During the review period (2011-12 to 2013-14), 20 incidents of fire were reported as fire accidents (CR-3, ECR-2, ECoR-1, NR-1, NCR-4, NFR-1, SCR-1, SER-1, SWR-1, WR-3, WCR-2).

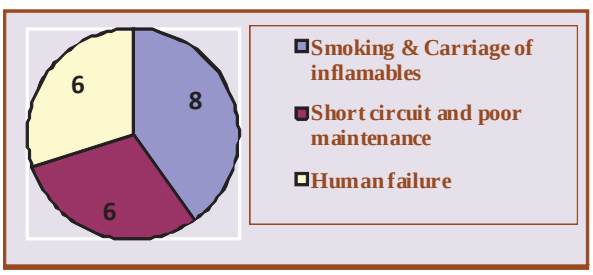


Table No. 1. 11– Causes of accidents in passenger coaches - Reported as 'Fire Accidents'

Sl. No.	Causes of accidents	Number of accidents	ZRs where accident occurred
1.	Smoking and carriage of inflammable articles	8	SCR, WR, CR (2), ECR, NCR, SER, WCR
2.	Short circuits and poor maintenance	6	ECOR, NCR (2), NFR, WR, NR
3.	Human failures	5	ECR, NCR, SWR, WCR, WR

Source: Accident investigation reports

Out of the above, the causes of the five[17] major fire accidents were not concluded as detailed below:

1. The fire in III AC coach of train No.13009 on 22-11-2011 was *most probably caused* by throwing of lighted cigarette butt on the floor of the coach which ignited clothes around followed by spread of fire in curtains of the coach. The spilled over liquor present on the floor of the coach also got ignited and aggravated the fire. (ECR).

2. The incident of fire in S-11 coach of train No.12622 on 30-07-2012 was *most probably caused* due to accidental igniting of fire crackers being carried in the coach (SCR).

3. The accident of fire in coach No.SC99480 GS on 16-10-2012 in Train No.57660 was *most probably caused* by pouring petrol and setting themselves on fire by unknown persons inside the toilet of the coach (CR).

4. The fire in AC three tier coaches of 16594 on 28-12-2013 was *most probably* caused by advertent act or by an act of negligence on the part of unidentified passengers or persons (SCR).

5. The incident of fire in train No.19019 on 08-01-2014 occurred due to *inadvertent act or by an act of negligence on the part of passengers or persons*. (WR).

In view of the above, RB needs to ensure that the causes of fire accidents are established conclusively to take effective corrective action for prevention of recurrence.

(ii) Other instances of fire in passenger coaches

In addition, Audit came across 29 other fire related accidents in passenger coaches (in running trains/workshops/coaching depots) which occurred during the period 2011-12 to 2013-14 and were not reported as fire accidents.

[17] ***Howrah-Dhanbad Exp.(22.11.2011), Tamil Nadu Exp.(30.07.2012), Hyderabad-Solapur Exp.(16.10.2012), Nanded Exp.(28.12.2013), Bandra-Dehradun Exp.(08.01.2014)***

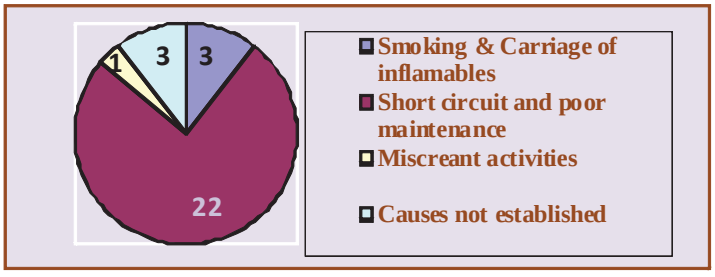
CRS also flagged this issue of non reporting of the fire accident in Delhi-Mumbai Duronto express of 11 November 2012 between Rauti and Bhairogarh stations (WR).

The causes for these 29 instances of fire (SR-12, MR-6, SCR-2, NR-2, SWR-2, WR-2, CR-1, ECOR-1, NER-1) were short circuits, smoking, miscreant activities and negligence during maintenance as detailed below:

Table No. 1.12– Causes of accidents in passenger coaches - not reported as 'Fire Accidents'

Sl. No.	Causes of accidents	No. of accidents	ZRs where accidents occurred
1	Short circuits and poor maintenance	22	SR (9), MR (6), WR (2), CR, SWR, NR (2), SCR
2	Smoking and carriage of inflammable	3	SR (2), SCR,
3	Miscreant activities	1	ECoR
4	Causes not established	3	NER, SR, SWR

Source: Accident investigation reports



RB replied (April 2015) that necessary instructions were issued to ZRs for corrective action.

The reply is too general in nature. Non reporting of these incidence as fire accidents deprived the Railway Administration from taking corrective action. RB should strictly ensure that all instances of fire are reported as fire accidents and initiate corrective remedial action.

1.6.15 Need for amendment of Railway Act, 1989

Government of India, Ministry of Health and Family Welfare (May 2008) has issued notification for prohibition of smoking in public places as per Prohibition of Smoking in Public Places Rules 2008. This rule covers Railway premises also. However, Section 167 of Indian Railway Act 1989 was not amended prohibiting smoking in trains and railway premises. Further, the inquiry Committee on the fire accident in train No.12809 on 06-01-2014 (CR) has also recommended for the amendment to Section 167 of Indian Railway Act 1989.

RB has not yet amended Section 167 of Indian Railway Act to prohibit smoking in trains and railway premises and provide stringent punishment for violation.

1.7 Conclusion

Though IR has initiated use of material with fire retardant properties, it is yet to develop state-of-the-art testing facilities for testing the materials to conform to the latest international norms. The fire simulation software procured in 2010 at a cost of ₹ 1.5 crore, meant for optimisation of coach design could not be put to optimum use due to non-availability of testing facilities. Status of procurement and utilization of fire retardant materials by ZRs was not monitored by RDSO. There is also shortage of number of suppliers of some of the critical fire retardant materials.

The feature of auto closing of vestibule doors which could contribute to avert the spread of fire in an accident has not been extended to non LHB coaches. The High Level Safety Committee (2012) had noted that passengers could not jump out without any aid during an eventuality since existing size of EOWs in non-AC coaches was not adequate. They had, therefore, recommended a change of design of EOWs. However, nothing in this regard has been mentioned by RB in their reply (April 2015). Automatic fire and smoke detection system in non-AC coaches were also not provided.

Para 8.1 of 'terms and conditions of agreement' for leasing of parcel space in brake vans/ parcel vans does not specify anything about scrutiny by Railway officials in loading of parcel vans, etc. This para is not modified to ensure that no inflammables/ banned items were loaded into the parcel vans which lead to compromising safety of passenger trains.

Sizable percentages of employees have not attended training, awareness programme and mock drills on fire fighting. Regular passenger awareness programme was not conducted by RB. Fire safety stickers are also not pasted at prominent locations to reduce fire prone activities at stations and trains. Further, the instructions related to smoking, carriage of inflammable articles were not implemented effectively.

Short circuit and poor maintenance is also one of the major causes for fire accidents. Cooking and fire prone activities continued in pantry cars. As per the norms of UIC (UIC 564-2), one extinguisher in each vehicle with seated places and two extinguishers in each sleeper coach are required to be provided. However, fire extinguishers were not provided in the sleeper Class, Second sitting, General Seating Compartments. Section 167 of Indian Railway Act 1989 was not amended prohibiting smoking in trains and railway premises.

1.8 Recommendations

In order to prevent fire accidents Ministry of Railways (Railway Board) should:

- *Closely monitor creation of facilities at RDSO for testing fire retardant materials and intensify efforts to align the present specifications with the international norms to match with the railways system worldwide, continue their efforts to cross check the quality of the supplies by testing the samples at outside laboratories.*
- *Revisit the agreement (Para 8.1 f) with the lessor of the parcel space in brake vans/ parcel vans to incorporate provision for supervision by Railway staff or impose stringent penalty for violation along with strengthening surprise check mechanism.*
- *Explore possibility of provision of reliable fire detection and warning/ public address system in the coaches, parcel vans, brake vans etc.*
- *Review the system of monitoring of implementation of accepted recommendations of various Committees (High Level Safety Review Committee, CRS / SAG / other Inquiry Committees etc.) to ensure their proper implementation.*