Environment Management in Indian Railways-Station, Trains & Tracks
Environmental auditing

Introduction

- Environmental auditing is an attempt to provide information on the environmental performance of an organisation, and thus include environmental issues in the decision making process.
- An environmental audit assesses the nature and extent of harm to the environment caused by the activities, wastes or noise from a particular organisation.
- Environmental audits must be independent, objective, credible and transparent in order to be successful.
Environmental auditing

Background

More recently, environmental auditing has been used as an extremely valuable tool for assessing an organisation’s environmental management systems, policy, and equipment. It provides the company with recommendations on how it can improve its environmental management practices, and reduce the impact that a company is having on the environment.

Greater awareness and understanding of environmental issues have led the supreme audit institutions (SAIs) to introduce the environmental auditing in the public sector.
Areas of environmental auditing

Areas of environmental auditing normally include:

- Material management, savings and alternatives;
- Energy management and savings;
- Water management and economy of use;
- Waste generation, management and disposal;
- Noise reduction, evaluation and control (internal and external);
Audit Planning

- Environmental management is essentially the management of interaction by modern human societies with, and impact upon the environment. The National Environment Policy 2006 articulates our national commitment to a clean environment as mandated by the Constitution.

- The principal objectives of the National Environment Policy include conservation of critical environmental resources to integrate environmental concerns into policies and projects for economic and social development. Further, one of the principles of this policy clearly states that to achieve sustainable development, environmental protection shall be an integral part of the developmental process and cannot be considered in isolation from it.
Introduction

Indian Railways

- Third largest network in the world
- Covers 64460 route kilometers across the country
- Running about 10000 trains per day through more than 7000 stations
- Handles 7651 million passengers and carries 922 million metric tonne of goods traffic per annum.
- Bulk consumer of energy besides generator of waste in stupendous proportion.
Risk Assessment

In Indian Railways

- No comprehensive policy for environment management;
- Media Reports on pollution issues at Railway Sidings;
- Complaints on improper disposal of garbage on trains and at stations;
- Issues regarding sanitation in trains;
- Commitment of Minister for Railways in the Budget speech towards conservation of energy;
- No guidelines regarding transportation of freight by Central and State Pollution Control Boards.
Statutory Provisions

- The Environment (Protection) Act, 1986
- The Air (Prevention and Control of Pollution) Act, 1981
- The Water (Prevention and Control of Pollution) Act, 1974
- The Noise Pollution (Regulation and Controls) Rules, 2000
- The Hazardous Wastes (Management and Handling) Rules, 1989
- The Plastic Manufacture, Sale and Usage Rules, 1999
- The Wild Life (Protection) Act, 1972
- The Forest (Conservation) Act, 1980
Audit Planning

- Decision to cover all statutory provisions relating to Environment Pollution;
- Cover all operations relating to Indian Railways;
- Whether environmental protection is an integral part of the operational process of IR.
- Considering the magnitude of operations, the Performance Audit was broadly divided into three segments spread over a period of three years -- 2011-14
Audit Planning-Contd...

- Entire operations of Indian Railways was divided into two parts - Core activities and Non-core activities.
- Core activities of Indian Railways are carrying both passengers and freight.
- Non core activities include workshops and sheds for maintenance of wagons/coaches/locomotives, production units for production of locomotives and coaches, providing health care facilities to employees etc.
- Conduct pilot study to examine field level conditions.
## Audit Planning – Contd...

### Performance Audits planned

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Environment Management in Indian Railways - Stations, Trains and Tracks

- Principal Directors of Audit of three Zones were nominated for conducting Pilot Study
- Broad framework of the proposed Performance Audit was finalised;
- Scope and issues to be covered, was also discussed with an Environmental Scientist.
Results of Pilot Study

- No Comprehensive policy for controlling pollution in Indian Railways;
- No clear guidelines issued by the State or Central Pollution Control Boards regulating the activities of Indian Railways;
- No benchmark/performance indicators to assess the impact on environment;
Results of Pilot Study- Contd....

- No Comprehensive policy in waste management;
- Lack of monitoring by the State or Central Pollution Control Boards for adhering to statutory guidelines;
- Poor sanitation and cleanliness on trains and at stations.
Audit Objectives

Examining Indian Railways initiatives and commitment while operating and maintaining its stations, trains and tracks towards:

- Prevention and control of air, water and noise pollution;
- Management and conservation of natural resources towards sustainable development with specific reference to conservation of water, energy and wild life;
- Waste management.
Scope of Audit

- Evaluation of the policy framework governing environmental management in IR that includes stations, trains and tracks with regard to –
  - Pollution of air, water and noise,
  - Conservation of Natural Resources and;
  - Waste Management

- Evaluating the compliance of Indian Railways(IR) with the laws/rules/regulations governing environmental management in India.

- The compliance of IR with respect to the policies/regulations issued by it.
Scope Limitation

- Codes and Manuals of IR give detailed instructions regarding transporting different types of Commodities:
  - Type of wagon to be used
  - Packing Conditions
  - Environment Aspects not covered
- No Specific criteria laid down by IR or CPCB to measure performance in minimizing environment pollution
- Used guidelines included in the various Acts to control pollution and guidelines issued by some SPCBs to control pollution.
- This was a scope limitation.
Sample Selection

- For examination of certain issues at micro level, a sample of 212 stations from various categories was selected.
- 34 sidings and 31 Goods Sheds were selected to ascertain the level of compliance with the statutory regulations.
- 35 Permanent Way sections were selected for examining the issues pertaining to ecology of forest areas, tunnels, road under bridges etc.
Audit Methodology

- Examination of records relating to guidelines/instructions issued by Ministry of Railways regarding policy formulation and issue of directives to zones for implementation;
- Checking of compliance at the Zonal level with the various directives issued by the Railway Board.
- Joint inspection at Stations and trains with Railway officials;
Audit Methodology- Contd….

- Obtaining feedback from passengers through survey conducted at some important stations and in Mail/Express trains;

- Study of the pollution level at stations/sidings was conducted through CPCB as there was no system of monitoring and documentation regarding air, water and noise pollution in station premises/sidings,
Audit Findings

- IR is the single largest carrier of freight and passengers in the country and by the very nature of its operations;
- It has a clear responsibility towards conservation of the environment. Its approach to pollution control is significant for tackling environmental challenges to the country.
- RB is yet to issue any comprehensive guidelines specifically for sidings, handling and transport of commodities.
- no standard instructions regarding packing and transporting of different kinds of goods have been issued by the Railways in their codes and manuals even though separate detailed instructions for carriage of commodities like coal, iron ore, cement, POL, fertilizer etc. exist in their manuals.
Audit Findings- Air Pollution

Section 21 of Air (Prevention and Control of Pollution) Act, 1981.
This provides that no person shall, without the previous consent of State Pollution Control Board, establish or operate any industrial plant in an air pollution control area.

- Operation of Railway sidings/goods sheds are covered under the above Act;
- Since no guidelines were issued by RB, we judged compliance w.r.t Statutory Regulations, SPCB guidelines and others.
Audit Findings - Air Pollution Compliance with Statutory Regulations

- Consent for Operation (CFO) was obtained only for nineteen (55 per cent) out of the 34 sidings tested checked;

- 10 out of the remaining 15 sidings had not obtained CFO on the ground of absence of specific instructions from the Railway Board / Pollution Control Boards;

- CFO was not obtained by sidings having unloading facility only.

- No action taken either by the Railway Board or SPCBs to take clearances from SPCBs.
Non-Compliance with SPCB Guidelines

- Guidelines issued by SPCBs of three States of West Bengal, Jharkhand and Odisha for freight operations at sidings.
- The guidelines provide for covering of open wagons carrying pollution intensive commodities, installation of water sprinkling system, plantation, construction of boundary wall, drainage and proper approach roads, covering of all minerals when not in use etc.
- Guidelines not followed in these three States;
Air Pollution - Contd....

Pollution scenario in zones not covered by any guidelines

- In most of the zones commodities like coal and iron ores were being carried in open wagons without covering with tarpaulin sheets;
- No action was taken by the Railway Administration to assess the air quality standard due to loading/unloading of cement and fertilizers. In fact courts have also imposed penalty against the Railway Administration and the consignor for failure to control fugitive emission.
- There was no system in place to measure the extent of pollution due to open carriage of polluting commodities;
- In some zones, petroleum products were found deposited alongside the track at the POL Siding.
Air Pollution - Contd

Pollution scenario in zones not covered by any guidelines

- In SCR, SPCB found that the value of Total Suspended Particulate Matter was 2179 micro gram per cum as against the norm of 500 micro gram per cum at the platform;

- Even after a lapse of two years, (April 2012) the Railway Administration had not fully complied with the directives for making provision of permanent water sprinkling system, erection of permanent wind breaking barriers, covering of trucks loaded with coal with tarpaulin etc.;
Air Pollution - Study Report of Central Pollution Control Board conducted at request of audit

- No monitoring of quality of air and water and noise level at stations and sidings;
- None of the stations covered in the study had applied for consents under the Air and Water Acts and also authorization for handling hazardous waste; In fact CPCB’s report took the stand that CFO for stations was also required. However they took no action to implement these.
- The values of various gaseous pollutants exceeded the national ambient air quality standards at a number of stations.
- Noise levels were in excess of the prescribed limit at all stations and there was no system of monitoring the noise level.
Air Pollution - From Trains

Emission from Diesel Locomotives

IR had not fixed any standards for emissions from the use of diesel for traction purposes nor did it monitor the emissions from diesel locos.

Use of bio-diesel

- Initiated to minimise air pollution as it reduces greenhouse gas emission.
- Number of steps taken to set up bio-diesel plants and for growing its inputs-the Jatropha seeds.
- Production and usage was very insignificant.
- No clear instructions from the Apex Authority regarding its use;
Air Pollution - On Trains

Dust level in passenger coaches

- In 2010, Railway Board directed RDSO to evolve standards to be maintained for dust particles inside non-AC coaches and develop dust mitigating measures to reduce the total dust values;

- No standards have been developed till now (March 2012)

- Passenger surveys conducted by Audit revealed that 39 per cent of Non-AC passengers and 35 per cent AC passengers felt that the quality of the air inside the coaches ‘Requires improvement’.
Noise pollution

- Noise monitoring by CPCB revealed that noise levels were in excess of the prescribed limit at all stations and there was no system of monitoring the noise level;
- Audit survey revealed that 31 percent of the passengers felt that noise level at stations was unbearable.
- A significant percentage of Non AC and AC passengers respectively were of the view that the noise level inside the coaches was very high.
Water pollution

IR is a major user of water for cleaning of trains and stations. IR also generates a large quantity of sewage on stations.

**Effluent Treatment Plant (ETP)**

Train maintenance processes generate effluents such as oil, antifreeze, cleaning chemicals etc., which can pollute the environment if not carefully controlled. Railway instructions envisage installation of ETPs at all major stations. ETP ensures that the effluent from Railway stations/sidings is discharged into the municipal sewers after proper treatment. We observed that-

- 14 ETPs were installed in three zones only.
- Most of the major stations were without ETPs;
- There was little initiative for making provision of ETPs.
- Study Report of Central Pollution Control Board revealed waste water/effluents directly discharged into Sewer
Conclusion

- IR is the largest carrier of bulk commodities like coal, iron ore, cement etc. which are basically pollution intensive.
- Railway Board failed to integrate environmental concerns with operational policies. Most internal instructions did not have an environmental orientation and were guided by commercial/administrative considerations.
- No guidelines were framed to address the issue of pollution during transportation/handling of commodities at railway / private sidings or goods sheds/ yards.
- Railway Administration failed to comply with the existing guidelines regarding pollution control i.e Consent to Operate (from the various SPCBs)
- The CPCB has been passive; only a few SPCBs have been proactive; leading to both non issue of guidelines for pollution control and non-compliance of existing regulations.
Conservation of resources is one of the means of reducing or controlling pollution;

IR is the single largest user of both energy and water in the country;

The policies adopted by the Indian Railways have a substantial impact on the conservation of both water and energy in the country;

Policies regarding conservation of forests and wildlife are important in conserving the natural habitat as railway tracks traverse the length and breadth of the country.
Water Conservation

IR adopted a number of best practices regarding conservation of water and has issued instructions for improving the efficiency of water use by installing of automatic coach washing plants and reducing the use of fresh water by way of recycling of water and rain water harvesting.

Water Recycling Plant (WRP)

- Despite instructions for providing WRP especially at locations where water is scarce, we observed that only five WRPs were installed in IR;
- In 3 zones though WRP sanctioned, work not completed.
- Action was not commensurate with the perennial water shortage in large parts of India;
Water Conservation

Automatic Coach Wash Plants

RB directed that Automatic Coach Wash Plants (ACWP) must be part of all green field and existing coaching depots to optimize utilization of water. We observed that

- in eight zones, no provision was made for setting up of ACWPs
- Only 8 ACWPs set up against 17 sanctioned in IR.
Conservation of Energy

Expenditure on fuel constitutes a major portion of IR’s Working expenditure. Energy Conservation Act, 2001 classifies IR as an energy intensive industry. Adoption of energy saving techniques is essential. We observed that-

- IR achieved the target in implementation of vital energy efficient measures at stations
- the overall achievement of the IR in electrification of level crossings with solar panel was far below the target set
- There was also no system of quantification of benefit accrued to Railways as a result of implementation of solar panels in electrification of level crossings.
Conservation of Energy- Energy Audit

- Energy audit was not conducted in a number of zones;
- Energy audit wherever conducted, implementation of their recommendations was only partial.
Carbon Credit Under Clean Development Mechanism

- Countries, such as India are expected to gain financial and environmental benefits by reducing the emission of Green House Gases.
- Potential to save energy by introducing locos with regenerative braking features, setting up of wind mills, installation of solar panels, etc. To claim Carbon Credits, project to be registered with National Clean Development Mechanism Authority (NCDMA).
- Two projects registered. One project is replacement of incandescent lamps (ICLs) with compact Fluorescent lamps (CFLs) in Railway’s residential quarters and the other project involves using EMUs with three-phase insulated gate bi-polar transistor (IGBT) technology and regenerative braking, No Carbon Credit obtained.
- Average savings in consumption of energy ranged between 12 to 26 per cent against envisaged level of 25 to 30 per cent.
Conservation of Forests and Wildlife

- A Railway line passing through a rural/forest area can interrupt migration patterns, destroy habitat and even kill animals attempting to cross the track. A large number of wild species are being killed annually due to accidents on Railway track.
- Data are available only for deaths of large animals like elephants. Train hits, of animals can also cause severe loss to the Railways. It could lead to derailment of the train, damage to the track, wagons and coaches; Injury and death of passengers and/or detention of the train.
- Sixty-seven animals died during the review period, 2006-11, which included 62 elephants and one lion Deaths were mainly in 3 zones i.e. NFR,SER and SR.
Conservation of Forests and Wildlife

- In March 2010, Ministry of Railways and Ministry of Environment & Forests jointly issued general advisories to prevent train accidents involving elephants. General advisories included measures like clearance of vegetation along, sensitising programmes for train drivers/guards, keeping the track free from food wastes and engagement of elephant trackers.
- These were partly implemented in SR and NFR.
- However animal mortality did not decline.
Conclusion

- IR has issued a large number of guidelines for the conservation of resources—both energy and water. However, their implementation is very low key and slow, indicating Railways lack of enthusiasm.
- Guidelines have been issued for reducing the consumption of both water and energy their implementation leaves much to be desired. The actual performance on the ground is below par.
Waste Management

- **Waste management** is the collection, transport, processing or disposal, managing and monitoring of waste materials;

- Waste, if not handled or disposed of properly, represents a threat to the environment and human health.

- Strategies for waste disposal should focus on waste prevention and minimization through the ‘3 Rs strategy’ - Reduce, Reuse and Recycle.

- Emphasis should be on waste prevention and waste minimization.
The RITES Report (2009) on plastic waste and its management at three major railway stations at Delhi (New Delhi, Old Delhi and Hazrat Nizamuddin station) estimated 23,250 Kg per day of waste generated at these railway stations including 6758 kg plastic waste;

No system of segregation of degradable and non-bio degradable wastes. Plastic wastes which are left behind goes to the landfill along with municipal solid waste.
As per the Municipal Solid Wastes (Management and Handling) Rules 2000, waste materials should be segregated into bio-degradable and non bio-degradable.

- Audit Report of 2007 of C&AG of India (Railways) on “Cleanliness and sanitation in IR” highlighted the following:
  - Absence of any mechanism to assess the quantum of waste generated at Railway stations and trains.
  - The solid waste generated at trains and stations was not being segregated into bio-degradable and non-biodegradable.
  - In their Action Taken Note, MoR stated that the garbage was being disposed off on a regularly in a phased manner. Regarding segregation of solid wastes, MR stated that IRCTC was advised to include solid waste regulations while framing conditions for their catering contracts.
  - PAC also made recommendations on the above. They also recommended that toilet standards in trains need to be upgraded. MoR had also assured the PAC regarding implementation of these issues.
Waste Management- Garbage Disposal

- Though garbage disposal system was in place, the same was not effective enough due to lack of monitoring to ensure compliance with statutory obligations. We observed that
  - In 64 per cent of stations test checked, centralized dumping yard was not available within the station premises resulting in littering near station premises and along tracks;
  - Transportation of garbage was not being done hygienically i.e. covered by tarpaulin;
In half the agreements entered into with the outside agencies, the quantity of garbage generated was not assessed and incorporated in the agreements; This was contrary to assurance given by MoR to PAC.

In a number of contracts, no separate clause was incorporated for segregation of wastes. Contrary to assurance given by MoR.

Rag picking contracts for collection of plastics, pet bottles etc. existed in only 69 per cent of the major stations test checked;

Despite entering into a contract with outside agencies, disposal of garbage was being done either by burning or dumping in Railway premises;

Inadequate provision of dust bins

Dustbins were either without lids or were overflowing.
Segregation of wastes

- There was no system of segregation of bio-degradable and non-biodegradable wastes at any station. Plastic wastes go to the landfill without any segregation.

- Rag picking contracts for collection of plastics, pet bottles etc. existed in only 69 per cent (85) of the major stations (123).

- The use of plastic bags within the station premises was not discouraged in the zones except in SWR and NCR where the Railway Administration advised all catering unit licensees to use eco-friendly, bio-degradable carry bags for take away food items from static units.
Waste Management - Green Toilets

- IR transports about 14 million passengers on 9000 trains every day. Passengers generate approximately 3980 MT of human waste per day that is dumped through 'open discharge' type toilets of these coaches directly onto the rail tracks. This pollutes environment at station as well as the areas through which the trains pass.

- The Supreme Court directed (January 2011) the Delhi High Court to enforce the implementation of Employment of Manual Scavengers and Construction of dry Latrine (Prohibition) Act.
Since 1993, Indian Railways has been experimenting with various environment friendly toilets like Vacuum Toilets, Control Discharge Toilets, Zero Discharge Toilets etc.;

Despite over two decades of experimenting IR is still conducting trials with different types of green toilets and has not been able to finalize the technology for 'green toilets'.

MoR stated that most available technologies are proven for foreign conditions. The technology are not subject to heavy usage as in IR; due to very long journey times, choking of toilets and use of toilets by non passengers also.

Adverse impact - premature renewal of rails and need for manual scavenging

premature renewal of 47 Kilometre of rail had resulted in an excess expenditure of ` 35.79 crores during the period 2007-11 alone.
Conclusion

- Waste management in Indian Railways primarily confined to disposal of garbage only;
- Negligence in adherence to instructions relating to adequate and proper collection, quantification, segregation and disposal of plastic waste at railway stations;
- Despite prolonged field trials on different models of environment friendly toilets in coaches, IR failed in freezing a suitable option of green toilets
Thanks