Inventorization of Railway Sidings and Guidelines for their Environment Management

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CENTRAL POLLUTION CONTROL BOARD

(Ministry of Environment & Forest)

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Foreward

The economic growth in the country has brought along rapid increase in the urbanization & Industrialization. Subsequently, there has been considerable increase in demand of material/ commodities to cater the needs of growing economy which is channelized through different means of transportation, however the railways plays a vital role in the same. Freight services constitute the most important segment of activity of railway business. Indian Railways have carried 970 million tonnes of revenue earning freight traffic during fiscal 2011-12. There is increase of 48 million tonnes i.e. 5.24 % over the freight traffic of 922 million tonnes carried during the corresponding period last year. Indian Railways carries bulk freight viz. ores and minerals, iron and steel, cement, mineral oils, food grains and fertilizers, containerized cargo etc.

In Indian Railway freight traffic is operated through Sidings. A railway siding is a place/ area which are used to receive, temporarily store, load / unload material in the rakes. Sidings may be used for marshalling, stabling, storing, loading and unloading vehicles. The materials/commodities are loaded and unloaded here with the linked network of rail track and roads. The loading and unloading activities of pollution intensive commodities creates immense nuisance in and around the site. Sidings have attracted attention in India particularly due to pollution generated during loading and unloading activities and their locations mainly in urban areas. The pollution control measures have not been provided in substantial manner at sidings thereby adversely affecting the environment. Over the years no data are available on management of pollution from sidings although there are environmental impacts on water, air, human health, soil degradation and vegetation etc.

Central Pollution Control Board (CPCB) has been frequently receiving Public Complaints from the nearby residents of the Railway Sidings regarding problems of Air Pollution mainly due to the loading/ unloading activities as well as transportation activities from Railway Sidings. As of now, there are no guidelines for the Environmentally Sound Management of the Railway Sidings in India. CPCB has therefore initiated a study on Inventorization of all the major sidings in the country and on the basis of the data collected through field surveys as well as Questionnaires the Guidelines on Environmentally Sound Management of Railway Sidings have been developed. CPCB hired the services of **Rail India Technical and Economic Service(** RITES), Gurgaon for carrying out this study.

The undersigned would like to record appreciations to **Shri BVM Rao,General Manager,UE Division, RITES Ltd&** his team for their dedication in carrying out this study with success. I would also like to extend my acknowledgement to **Dr. A.B Akolkar**, Member Secretary for his overall guidance in the execution of this study. Thanks are duly extended to **Shri R.C. Saxena** Scientist D and **Ms. Mita Sharma Scientist** E & I/c, UPCD for their extensive inputs. The contributions made by **Ms. Anjana Kumari** Scientist C and **Ms. Meetu Puri JSA** towards bringing out this report in present form are also duly acknowledged.

Hopefully the guidelines developed will be of use to the concerned department of Indian Railways & other stakeholders for Developing & Practicing future policies on Management of Railway Siding in an Environmentally Sound Manner.

(Shashi Shekhar, IAS)

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NOMENCLATURE

CPCB…….	Central Pollution Control Board
CFO……	Consent For Operation
POL……	Petroleum, Oil, & Lubricants
IR	Indian Railway
PFT……	Private Freight Terminal
FCI…….	Food Corporation Of India
OWS	Oil, Water Separator System
EMP……..	Environmental Management Plan
EIA…….	Environmental Impact Assessment
EMS……..	Environmental Management System
PM…….	Particulate Matter
MSDS……	Material Safety Data Sheets

CHAPTER – 1
INTRODUCTION

1.1 BACKGROUND

INDIAN RAILWAYS, the premier transport organization of the country is the largest rail network in Asia and the world's fourth largest under one management. Introduced in 1853 the Railway network in India spread and expanded rapidly and has become the principal mode of transport in the country. It has also absorbed advances in railway technology in tune with the requirement of moving large volumes of passenger and freight traffic. As a national common carrier transporting passenger and goods over its vast network, Indian Railways has always played a key role in India's social and economic development. It is a cheap and affordable means of transportation for goods and millions of passengers.

Indian Railways have carried 970 million tonnes of revenue earning freight traffic during fiscal 2011-12. There is increase of 48 million tonnes i.e. 5.24 % over the freight traffic of 922 million tonnes carried during the corresponding period last year. Indian Railways carries bulk freight viz. ores and minerals, iron and steel, cement, mineral oils, food grains and fertilizers, containerized cargo etc.

The bulk freight is being transported through long network of track spread throughout the country. In Indian Railway freight traffic is operated through Sidings. A railway siding is a place/ area which are used to receive, temporarily store, load / unload material in the rakes. Sidings may be used for marshalling, stabling, storing, loading and unloading vehicles. The materials/commodities are loaded and unloaded here with the linked network of rail track and roads. The loading and unloading activities of pollution intensive commodities creates immense nuisance in and around the site. The pollution can be generated due to lack of infrastructure and negligence. No data on pollution due to various activities from siding is available.

The activites related to the Railway Sidings if not managed properly results into generation of pollution & especially in the form of fugitive emissions. The present study has been taken up by **Central Pollution Control Board (CPCB)** in view of frequent Public Complaints received from the nearby residents of the Railway Sidings regarding problems of Air Pollution mainly due to the loading/ unloading activities as well as transportation activites from Railway Sidings. As of now, there are no guidelines for the Environmentally Sound Management of the Railway Sidings in India. The study involved Inventorization of all the major railway sidings across the country & subsequently development of Matrial/commodity specific guidelines for the environment management of the Railway Sidings in India.The study has been executed along with RITES Ltd. Gurgaon.

1.2 OBJECTIVES OF THE STUDY

Freight services constitute the most important segment of activity of railway business. Indian railways carry huge variety of goods such as mineral ores, fertilizers, petrochemicals, agricultural produce and others. Sidings have attracted attention in India particularly pollution during loading and unloading activities and their locations mainly in urban areas. The pollution control measures have not been provided in substantial manner at sidings thereby are adversely affecting the environment. Over the years no data is available on management of pollution from sidings although there are environmental impacts on water, air, human health, soil degradation and vegetation etc. The main aims and objectives of the study are briefly summarized as follows:

- Listing of all railway sidings in India,
- Sample survey of selected railway sidings to understand the present scenario along with nature of pollution,
- Methods for waste collection, treatment and disposal as available,
- Environmental management plan, and
- Guidelines for environmental management in sidings,

1.3 SCOPE OF WORK

The broad scope of work for the study is as follows:

- Inventorization of all major railway siding (Railway yards, Ports, Mines etc).
- Inventory will have information for railway siding such as Name, Location, Commodity, Quantity/annum and type of handling facility and measures taken for the control of emissions/discharges in the sidings.
- The above mentioned information will be based on the information/data collected through questionnaire surveys and visits to some selected sidings.
- The report will include data base in excel sheet covering, location, commodity and pollution control measures.
- The report will cover guidelines for the Environmental Management of Railway Sidings on the basis of the information collected in the study.

1.4 ACTS, LEGISLATION AND STANDARDS

At present, there are no rules/standard/guidelines available for pollution control measures for loading/unloading operation at sidings in the country. However, State Pollution Control Board, Orissa has formulated the guidelines for environmental management of mineral stack yards and sidings vide dated 16th April 2010 [1]. The guidelines are for the processing of consent application for mineral stack yards and siding. This guideline covers applicability, sitting considerations, checklist for

[1] www.ospcboard.org

environmental issues which is required for the consent to establishment process. The guidelines relavant to sidings from Odisha and Jharkhand Pollution Control Board is annexed at **Annexure 1.1**. Indian Railway Act, 1989 does not emphasize on the pollution prevention and its management issues. Indian Railway has many disciplinary codes and manuals viz, Operating manual for Indian Railways, Indian Railways work manual and Indian Railways Code for Traffic (Commercial) department. But no standard instructions regarding pollution due to handling and transportation of goods have been given.

Even though, Consent for Operation (CFO) exists in the section 21 of the Air (Prevention & Control of Pollution) Act, 1989 for establishing or operating any industrial plant in air pollution control area. Consent for Operation is required to be taken from the concerned State Pollution Control Board. As per Indian Railway Report[2], a test check revealed that only 55% of the tested sidings obtained Consent for Operation Certification. The important environmental legislations relevant to the study are summarized in **Table 1.1.**

TABLE 1.1: ACTS, RULES AND STANDARDS

SI		Acts	Description
1	Act	Environmental Protection Act,1986	• Central Government is empowered to take measures to protect and improve the environment. • Laying down standards for the quality of environment in its various aspects. • Laying down standards for emission or discharge of environmental pollutants from various sources whatsoever. • Restriction of areas in which any industries, operations or processing shall not be carried out or shall be carried out subject to certain safeguards. • Laying down procedures and safeguards for the handling of hazardous substances. • Preparation of manuals, codes or guideline relating to the prevention, control and abatement of environmental pollution.
2	Act	Air (Prevention and Control of Pollution) Act, 1981	• Lay down standards for the quality of air. • Control or abatement and prepare manuals, codes, or guideline relating to prevention, control or abatement of air pollution. • Subject to the provisions of section 21,

[2] Environmental Management in Indian Railways. Report No. 21 of 2012-13 (Railway)

			no person shall, without the previous consent of the State pollution control Board, establish or operate any industrial plant in an air pollution control area.
3	Act	Water (Prevention and Control of Pollution) Act, 1974	• Lay down standards for the quality of water. • Prepare manuals, codes, or guidelines relating to prevention, control or abatement of water pollution. • Subject to the provisions of section 24, no person shall knowingly cause or permit any poisonous, noxious or polluting matter determined in accordance with such standards as may be laid down by the State Board to enter (whether directly or indirectly) into any [stream or well or sewer or on land];
4	Guidelines	State Pollution Control Board, Orissa 16th April 2010	• Installation of water sprinkling system, plantation, construction of boundary wall • Proper drainage system • Approach road

1.5 FORMAT OF REPORT

The present Report has been divided in thirteen chapters, which are arranged in sequence to maintain the flow and continuity. The **Chapter - 1** is on Introduction, it gives background, scope of work, aims and objectives of study, Acts, Legislation and standards. **Chapter - 2**, presents the methodology adopted for the study. However detailed methodology is presented in the main body of various sections. The field studies of the project are presented in **Chapter – 3.** The **Chapter - 4** to **Chapter-11** are on the existing operation system and their environmentl management for coal, cemment, foodgrain & fertilizer, POL, mineral, Industrial, common commodity and container sidings respectively. Conclusion and challenges is presented in **Chapter-12**. Recommendations for efficient management of pollution measures at siding are presented in **Chapter-13.**

During the execution of the study, the project team has contacted various officials in the Government sectors dealing with the subject matter to collect the requisite data. Discussions, meetings and presentations were held for appraisal, feedback and consultation.

CHAPTER – 2

APPROACH AND METHODOLOGY

2.1 ORGANISATION STRUCTURE OF INDIAN RAILWAYS

The Indian Railway System is managed through zones and divisions. There are 17 numbers of zones in Indian Railways in which Metro Railway, Kolkata has been declared as New Zonal Railway i.e. 29.12.2010 with no railway sidings. Each of the seventeen zones is headed by a General Manager (GM). The zones are further divided into divisions under the control of Divisional Railway Managers (DRM). There are a total of sixty-eight divisions. The organization structure of the Indian Railway is shown in **Figure 2.1**.

In addition, there are a number of Production Units, Training Establishments, Public Sector Enterprises and other Offices working under the control of Railway Board. The list of zones in Indian Railways is listed in **Table 2.1**.

FIGURE 2.1
ORGANISATION STRUCTURE

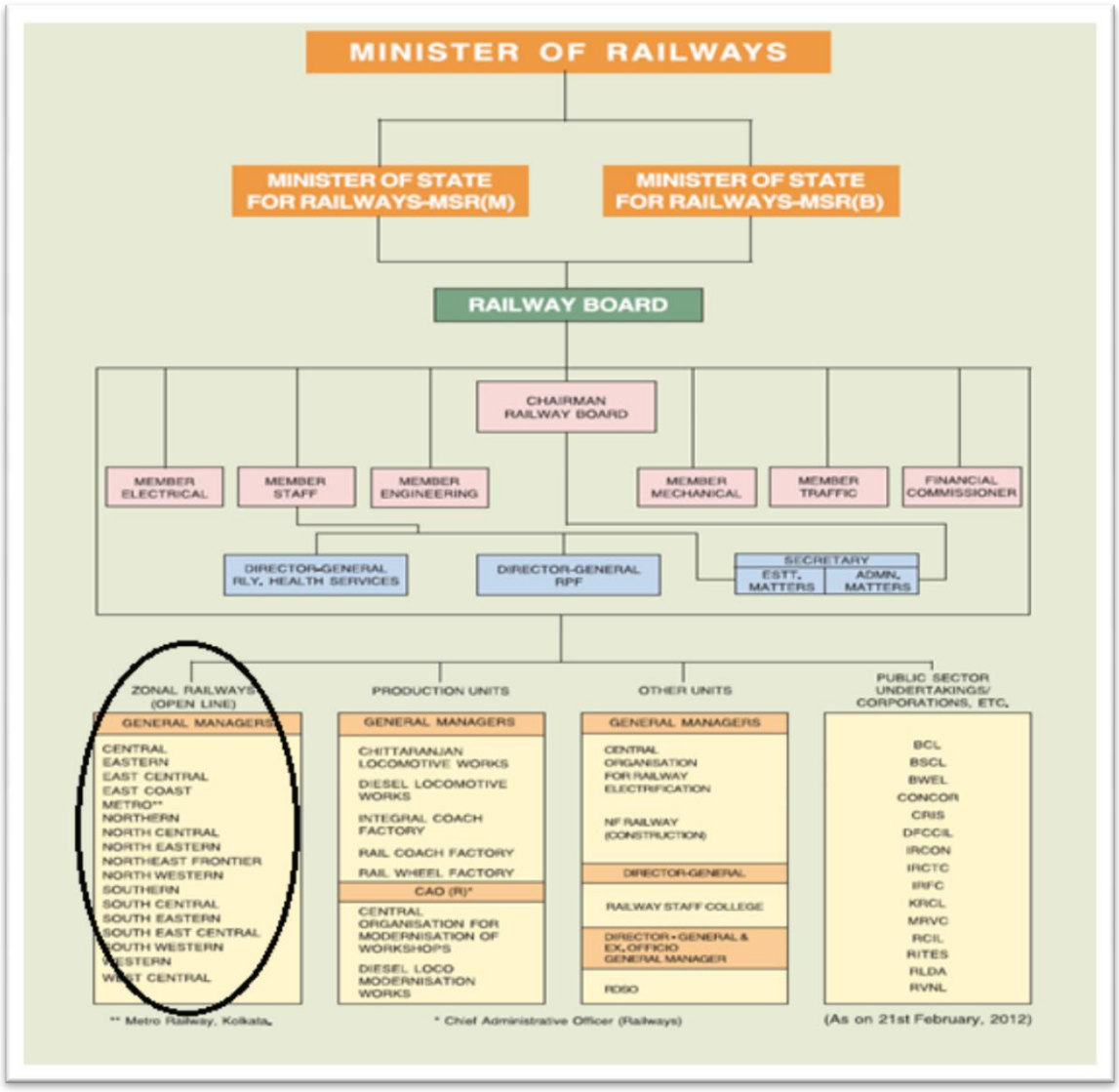


Table 2.1: List of Zones and Division with Headquarter in Indian Railway

Sl.	Zonal Railway	Headquarter	Division
1	Central Railway (CR)	Mumbai(CSTM)	Mumbai (BB)
			Bhusaval (BSL)
			Nagpur (NGP)
			Pune (PUNE)
			Solapur (SUR)
2	Western Railway (WR)	Mumbai(CCG)	Mumbai Central (BCT)
			Ahmadabad (ADI)
			Vadodara (BRC)
			Bhavnagar (BVC)
			Rajkot (RJT)
			Ratlam (RTM)
3	Southern Railway (SR)	Chennai	Madras (MAS)
			Madurai (MDU)
			Palghat (PGT)
			Salem (SA)
			Tiruchchirapalli (TPJ)
4	Eastern Railway (ER)	Kolkata	Asansol (ASN)
			Howrah (HWH)
			Malda (MLDT)
			Sealdah (SDAH)
5	Northern Railway (NR)	New Delhi	Delhi (DLI)
			Firozpur (FZR)
			Lucknow (LKO)
			Moradabad (MB)
			Ambala (UMB)
6	East Central Railway (ECR)	Hajipur	Dhanbad (DHN)
			Danapur (DNR)
			Mugal Sarai (MGS)
			Sonpur (SEE)
			Samastipur (SPJ)
7	East Coast Railway (ECOR)	Bhubaneshwar	Khurda Road (KUR)
			Sambalpur (SBP)
			Waltair (WAT)
8	North Central Railway (NCR)	Allahabad	Agra (AGRA)
			Allhabad (ALD)
			Jhasi (JHS)
9	North Eastern Railway (NER)	Gorakhpur	Varanasi (BSB)
			IzzatNagar (IZN)
			Lucknow (LZN)
10	Northeast Frontier Railway (NFR)	Maligaon (Guwahati)	Alipur Duar Jn. (APDJ)
			Katihar (KIR)
			Lumding (LMG)
			Rangiya (RNY)
			Tinsukia (TSK)
11	North Western Railway (NWR)	Jaipur	Jaipur (JP)
			Ajmer (AII)
			Bikaner (BKN)
			Jodhpur (JU)

12	South Central Railway (SCR)	Secunderabad	Secunderabad (SC)
			Vijayawada (BZA)
			Hyderabad (HYB)
			Guntakal (GTL)
			Guntur (GNT)
			Nanded (NED)
13	South Eastern Railway (SER)	Kolkata	Adra (ADRA)
			Chakradhar Pur (CKP)
			Kharagpur (KGP)
			Ranchi (RNC)
14	South Western Railway (SWR)	Hubli	Hubli (UBL)
			Bangalore (SBC)
			Mysore (MYS)
15	South East Central Railway (SECR)	Bilaspur	Bilaspur (BSP)
			Nagpur (NGP)
			Raipur (R)
16	West Central Railway (WCR)	Jabalpur	Jabalpur (JBP)
			Bhopal (BPL)
			Kota (KOTA)
17	Kolkata Metro	Kolkata	

Source: Indian Railway (fois information System)

2.2 METHODOLOGY

The methodology adopted for "*Inventorization of Railway Sidings and Guidelines for their Environment Management*" was the standard approach of desk research, field studies, data collection, analysis and interpretations. Meetings were conducted with railways board officials and at zonal levels. The approach and methodology adopted is elaborated in subsequent sections.

2.3 STUDY METHODOLOGY

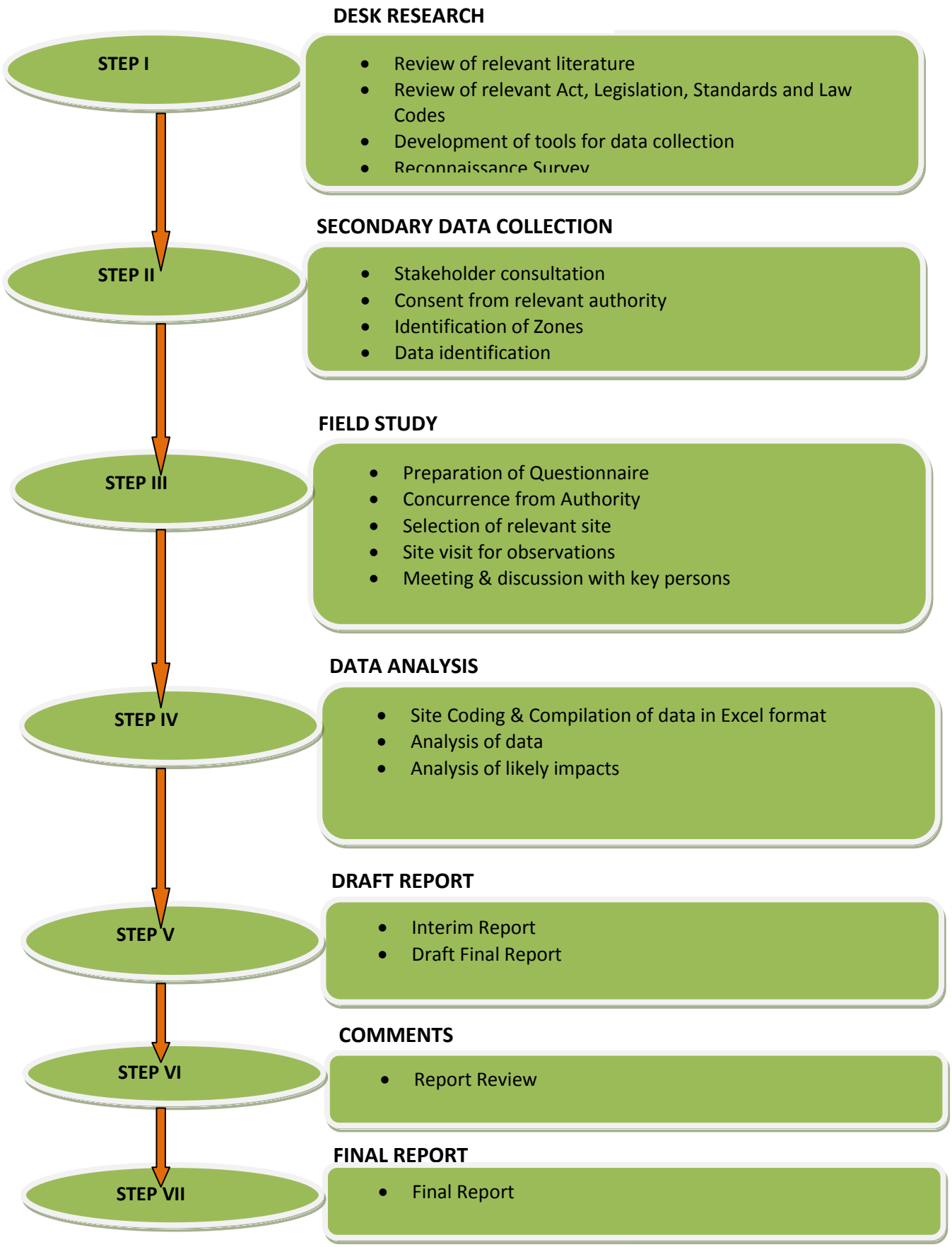
Inventorization of railway siding was a time taking and effort oriented task as huge numbers of sidings are operational in India. Various literature and reports were studied/reviewed to understand the concept and process involved to loading & unloading operation at railway siding. The pollution intensive commodities were also worked out through desk research. Numerous literature and report were consulted to know the relevant applicable acts, legislation and standards available in India. Before commencing the study, the project team carried out pilot surveys to ascertain operation and identification of data to be collected.

The study involved collection of data from zonal/divisional offices; questionnaire based field study and discussion/meetings with stakeholders. During discussion with stakeholders and preliminary survey it was realized that the required data for study could not be available at one place. Hence the data was collected from the various offices under a particular zone and divisions. A consent letter for data collection was

taken from the Freight & Marketing Division of Railway Board. The consent letter is listed at **Annexure 2.1**. The project team visited all zones and divisions for data collection of sidings. The data was collected pertaining to each of the sixteen zones of Indian Railways. The Excel sheet format has been prepared for data entry before start of the study. A format of the Excel sheet is enclosed as **Annexure-2.2.**

In order to collect site specific information, a questionnaire was developed. The questionnaire was based to collect site specific data available with concerned authority and during field observations. A copy of the questionnaire is attached at **Annexure-2.3**. The questionnaire covers the type of commodities handled, annual quantity, local logistics, handling arrangement and additional information like storage facilities, water requirement and pollution if any. The site visits were carried out at selected railway siding to fill up the questionnaire through observations and discussion with key personnel. These surveys were carried out to know the sources of pollution and its measures if any adopted at railway siding. The storage, loading, unloading practice of commodities were also observed during visits. The specific data regarding quantum of pollution generated during loading and unloading operations at sidings were not available. Hence, approach has been made to collect the data through observation and discussion/meetings with stakeholders. The approach and methodology for the present study is presented in **Figure 2.2**.

Figure 2.2: Approach and Methodology for the study



CHAPTER – 3
INVENTORIZATION & FIELD STUDY

3.1 INVENTORIZATION

Inventory survey was carried out for all sixteen zones of Indian Railway for the collection of the information about existing status of sidings and subsequently to prepare the inventorisation report. Project team visited all the zones extensively to collect the required data, making liasoning and discussing the issues with concerned officers. The project team compiled the data for all the sixteen zones and the same was subsequently analysed & presented in this chapter. The list of sidings and Goodshed is prepared on the basis of commodity handled. The total number of siding and Good shed zone wise have been bifurcated and presented in subsequent section. The Inventorization of originating and terminating traffic was carried out for the year 2011-2012.

3.2 FREIGHT TRAFFIC

The Indian Railways carry nearly 970 million tonnes of freight in a year. This translates to about 5000 freight trains daily. Freight trains bring two thirds of the Indian Railway revenues and are referred to as the bread earners for the Railways. The major commodities carried by Indian Railways are Coal, Iron Ore, Food grains, Iron & Steel, Cement, Petroleum products, Fertilizer and Containerized Traffic. There are specialized wagons to handle the transportation needs of the different types of commodities. The movement of bulk commodities in the last four year is presented in **Table 3.1**. Histogram showing movement of commodities being delivered over the years is presented in **Figure 3.1**. The zonewise movement of major bulk commodities for the years 2007 to 2012 is presented in **Figures 3.2** to **Figure 3.4**.

Table 3.1: Movement of bulk commodities in the last four years[3]

Sl	Commodity	2007-08		2008-09		2009-10		2010-11		2011-12	
		MT	%	MT	%	MT	%	MT	%	MT	%
1	Coal	336.83	42.43	369.63	44.35	369.15	44.62	420.37	45.61	455.81	47.04
2	Food grains	38.23	4.82	35.51	4.26	38.96	4.36	43.45	4.71	46.40	4.79
3	Iron & Steel	25.79	3.25	28.58	3.43	31.85	3.59	32.82	3.56	35.15	3.63
4	Iron ore	136.69	17.22	130.58	15.67	132.74	14.95	118.46	12.85	104.70	10.80
5	Cement	78.99	9.95	86.24	10.35	93.15	10.49	99.08	10.75	107.66	11.11
6	POL	35.88	4.52	38.08	4.57	38.88	4.38	39.29	4.26	39.77	4.10
7	Fertilizers	35.83	4.51	41.35	4.96	43.68	4.92	48.22	5.23	52.69	5.44
8	Lime stone & Dolomite	14.14	1.78	13.34	1.60	14.77	1.66	16.37	1.78	17.66	1.82
9	Stones(Incl. Gypsum) other than marble	13.92	1.75	10.48	1.26	11.44	1.29	11.66	1.27	12.96	1.34
10	Salt	4.62	0.58	4.83	0.58	4.76	0.54	4.64	0.50	5.14	0.53
11	Sugar	5.98	0.75	4.36	0.52	3.97	0.45	3.76	0.41	4.56	0.47
	Sub Total	**726.90**	**91.56**	**762.98**	**91.55**	**810.08**	**91.25**	**838.12**	**90.93**	**882.50**	**91.07**
12	Commodities other than above	66.99	8.44	70.41	8.45	77.71	8.75	83.61	9.07	86.55	8.93
	Grand Total	**793.89**	**100**	**833.39**	**100**	**887.79**	**100**	**921.73**	**100**	**969.05**	**100**

[3] Annual Statistical Statements 2010-11, http://www.indianrailways.gov.in

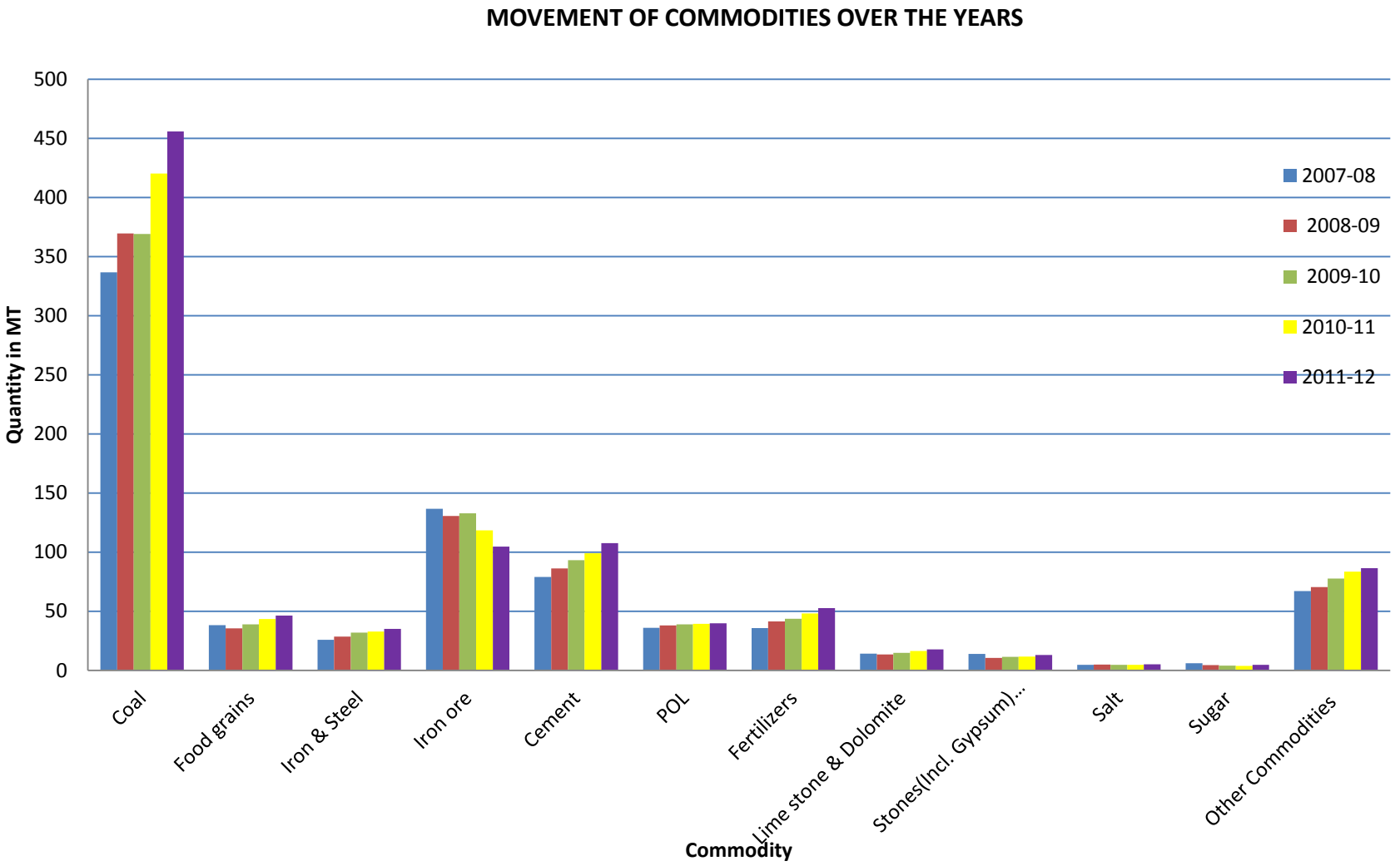

MOVEMENT OF COMMODITIES OVER THE YEARS
Quantity in MT
500
450
400
350
300
250
200
150
100
50
0
2007-08
2008-09
2009-10
2010-11
2011-12
Coal
Food grains
Iron & Steel
Iron ore
Cement
POL
Fertilizers
Lime stone & Dolomite
Stones(Incl. Gypsum)...
Salt
Sugar
Other Commodities
Commodity

FIGURE 3.2
ZONEWISE MOVEMENT OF COAL

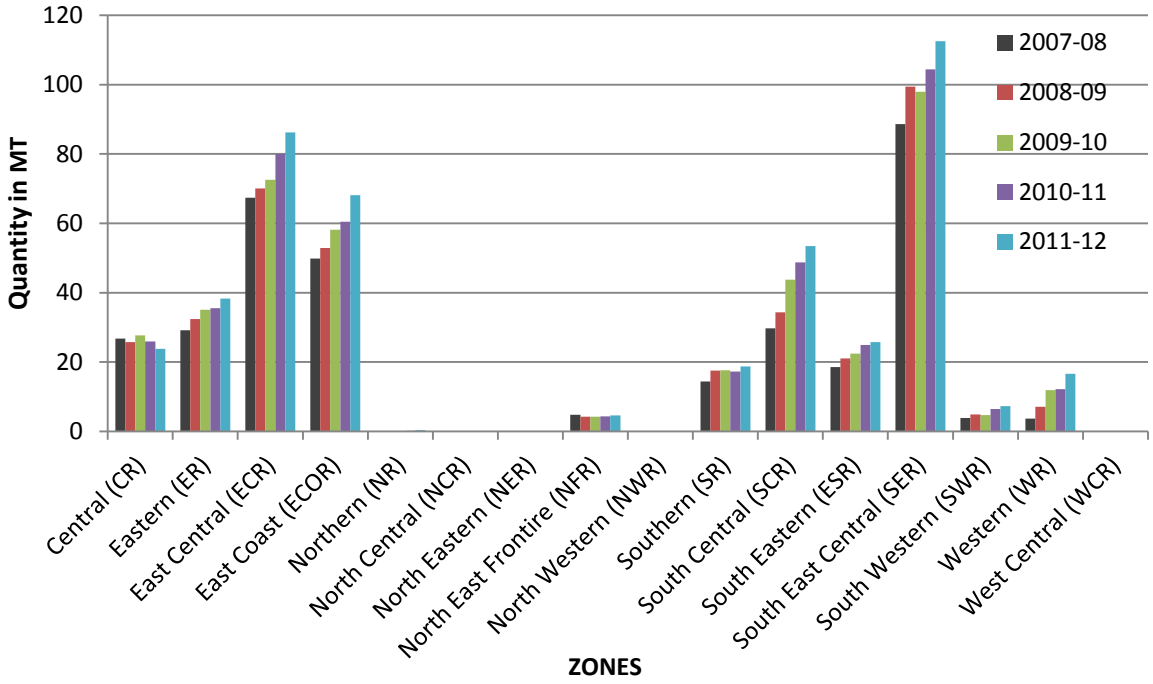


FIGURE 3.3
ZONEWISE MOVEMENT OF IRON ORE

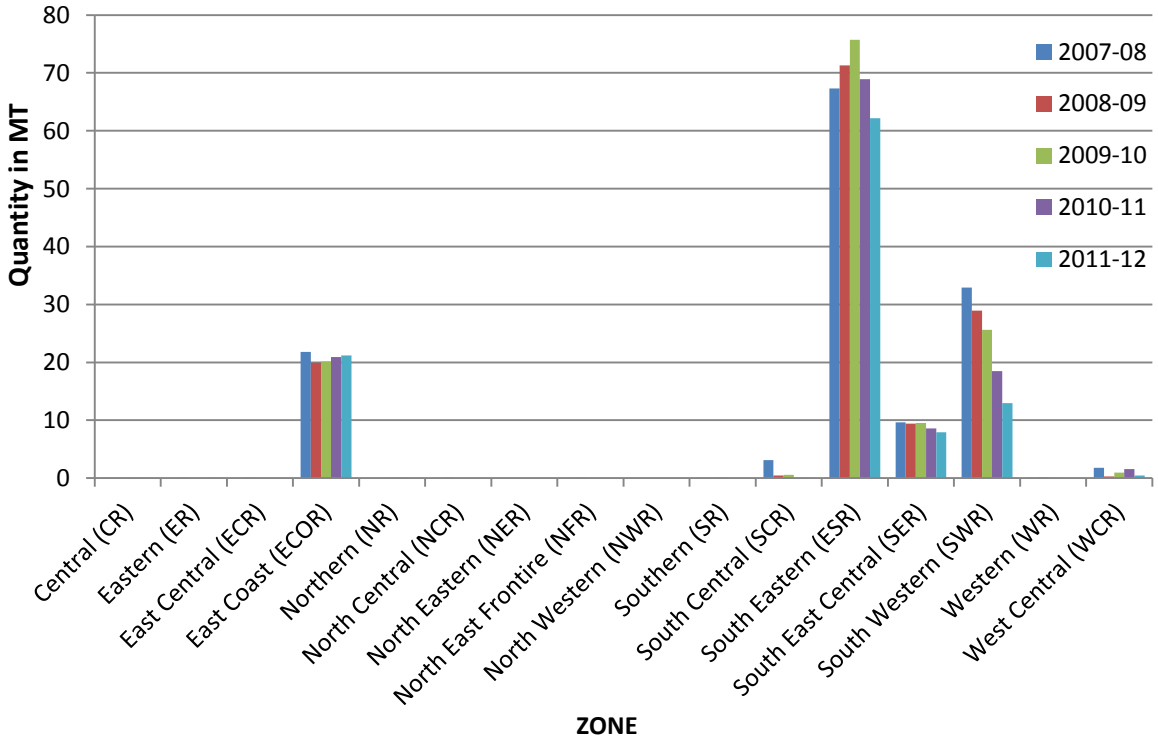
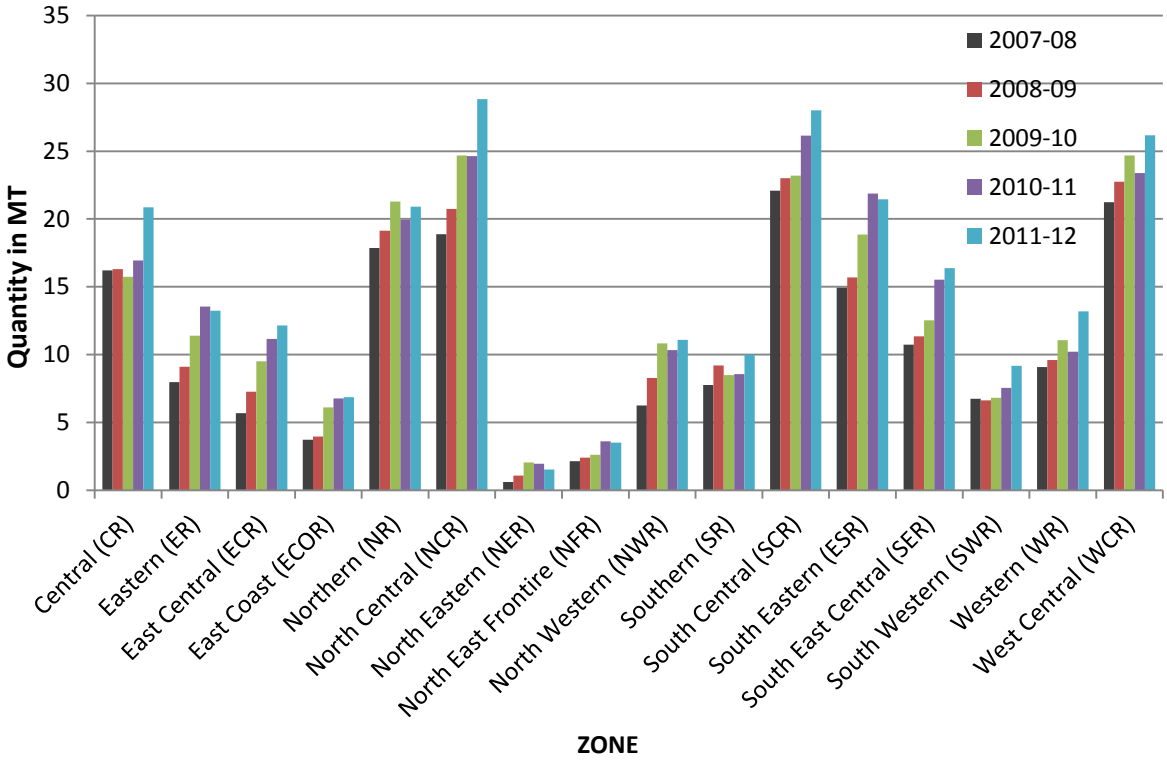


FIGURE 3.4
ZONEWISE MOVEMENT OF CEMENT



3.3 CLASSIFICATION OF SIDINGS

Siding is a short stretch of railway track connected to a main line, used for storing rolling stock or to enable trains on the same line to pass and a short railway line giving access to the main line for freight from a factory, mine, quarry, etc.

There are four types of sidings as per the ownership i.e. Private, Assisted, Departmental (Railway) and Defense (Military). The details of these sidings are given in subsequent section.

i. **Assisted sidings:** An assisted/private siding is a siding laid out to serve a Government Department factory, mill or other industrial premises other than a colliery or a mining area, under a special agreement. The cost is borne jointly by Railways and owners of the siding.

ii. **Private sidings:** For the use of owners of the sidings, for which cost is borne by the owners of the sidings.

iii. **Departmental (Railway) siding**: For departmental use.

iv. **Military siding:** Military purpose.

The criteria for locating siding mostely depend upon the bulk cargo origination or destination like industrial hubs, mineral region and ports etc. The terms and conditions on which the siding is to be worked will be embodied in an agreement,

which will be executed by each siding user with the railways. The most of the railway owned siding either leased out to the private parties or use for the railway purpose.

GOODSHED: Goodsheds are the Railway building designed for the storing goods before or after carriage in a train**.** Goodsheds is a terminal to cater the cargo movement especially using the railway goods terminal for loading & unloading respectively. Generally Goodsheds are located at strategic locations like at junction, capital cities, industrial hubs and over important stations on the truck route.

3.4 ANALYSIS OF DATA

All the data collected from zones was scrutinized zonal wise and the analysis of the same has been done on the basis of number of siding in a zone and commodity wise sidings in India. The analysis of commodity wise railway sidings reflects the significance of that siding with respect to pollution.

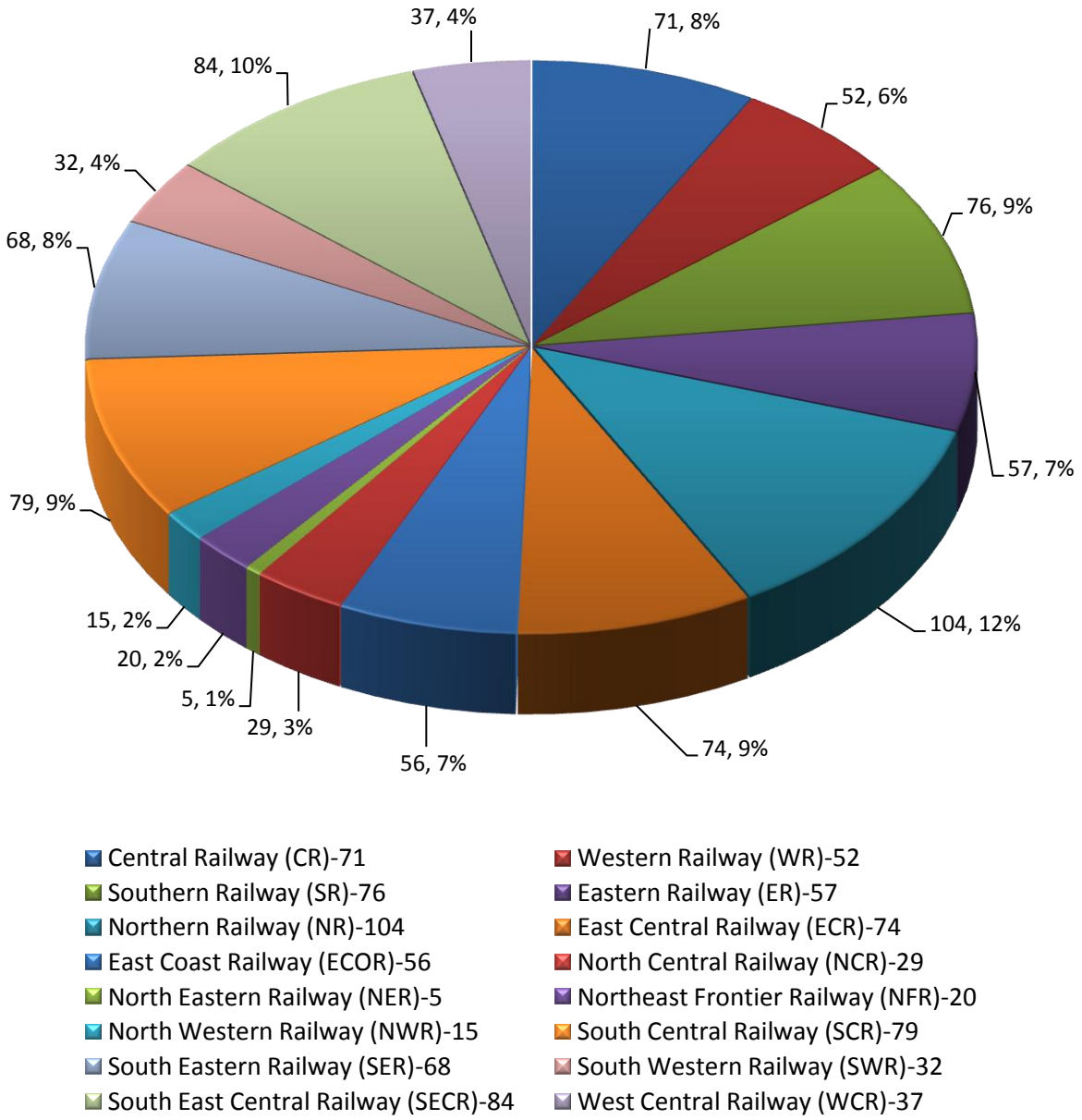
3.4.1 Zone wise sidings

The total 859 sidings are operational in India. The zone wise siding details are given in the **Table3.2**. The graphical representation of zone wise railway sidings in India is given in **Figure 3.5.**

TABLE 3.2: NUMBER OF SIDINGS IN INDIA

Sl.	Zonal Railway	Headquarter	No. of sidings
1	Central Railway (CR)	Mumbai(CSTM)	71
2	Western Railway (WR)	Mumbai(CCG)	52
3	Southern Railway (SR)	Chennai	76
4	Eastern Railway (ER)	Kolkata	57
5	Northern Railway (NR)	New Delhi	104
6	East Central Railway (ECR)	Hazipur	74
7	East Coast Railway (ECOR)	Bhubneshwar	56
8	North Central Railway (NCR)	Allahabad	29
9	North Eastern Railway (NER)	Gorakhpur	5
10	Northeast Frontier Railway (NFR)	Maligaon (Guwahati)	20
11	North Western Railway (NWR)	Jaipur	15
12	South Central Railway (SCR)	Secundrabad	79
13	South Eastern Railway (SER)	Kolkata	68
14	South Western Railway (SWR)	Hubli	32
15	South East Central Railway (SECR)	Bilaspur	84
16	West Central Railway (WCR)	Jabalpur	37
17	Kolkata Metro	Kolkata	Nil
		Total	**859**

FIGURE 3.5
ZONEWISE NUMBER OF RAILWAY SIDINGS

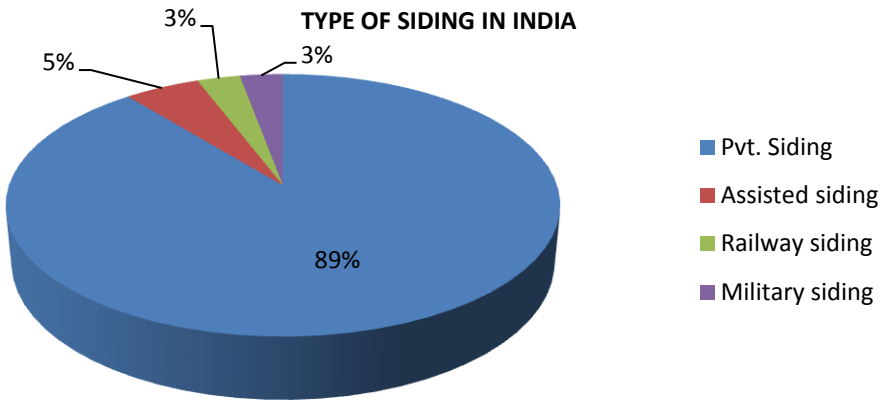


It was observed, that Northern Railway Zone is having maximum number of sidings followed by South East Central Railway Zone. The lowest numbers of siding were observed in North Eastern Zone.

3.4.2 Type of Sidings

Sidings in India are classified in four groups viz Private, Assisted, Railway (Departrmental) and Military. **There are 859 numbers of sidings existing in India. Out of these, 768 numbers are Private, 44 are assisted, 25 Railway and 25 Military sidings.** The graphical representation for types of sidings in India is presented in **Figure 3.6**.

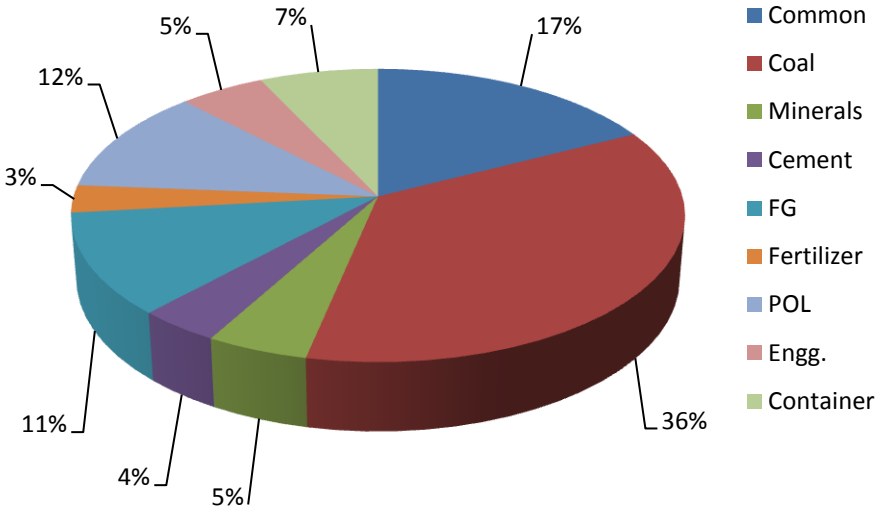
FIGURE 3.6
TYPE OF SIDING IN INDIA



3.4.3 Commodities Handled at Sidings

As mentioned earlier in section 3.2, the major commodities handled by IR's are Coal, Iron Ore, Food grains, Cement, Petroleum products, Fertilizer and Containerized Traffic**. Hence, nine categories of commodities have been selected for study and analysis purpose. These nine categories of commodities are Coal, Minerals, Cement, Food Grains, Fertilizer, Petroleum Oil & Lubricants (POL), Industrial (Engineering) materials, Containers and common except (POL**). The sidings may not restrict to a particular commodity only. The data reflects that major commodities are handled at a particular siding is considered for the study.

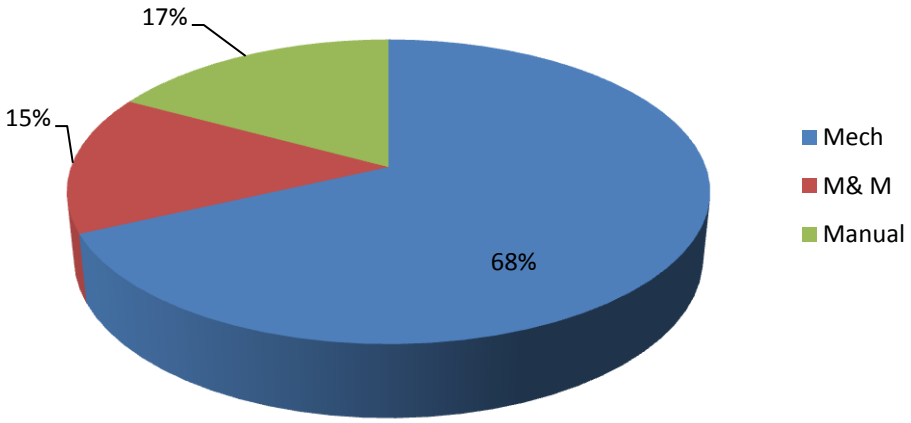
FIGURE 3.7
COMMODITIES HANDLED AT SIDINGS



3.4.4 Mode of Commodity Handling

The nature, quality and quantity of pollution at sidings is largely depends upon the type of commodities and their handling procedures. Three categories of handling arrangements are identified to analyze the collected data. These categories are Mechanical, Mechanical & Manual and Manual. The analysis of data reveals that, out of 859 sidings, 585 numbers of sidings are operating by mechanical means, 147 numbers are operating by manually and 122 number of siding uses both i.e. Mechanical & Manual (M&M). The JCB, Loader, Loading arms & Forklift are considered as mechanical arrangement. The **Figure 3.8** shows percent of commodities at sidings handled by three means of handling arrangement. The type of siding, the type of commodities handled and the mode of handling with respect to each zone is presented graphically in **Figures 3.9** to **3.56**.

FIGURE 3.8
MODE OF HANDLING FOR COMMODITIES



South East Central Railway Zone (SECR)

FIGURE 3.9
TYPE OF SIDING AT SECR ZONE

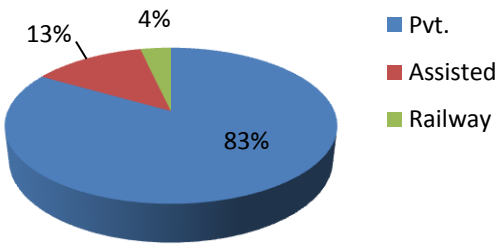


FIGURE 3.10
TYPE OF COMMODITY AT SECR ZONE

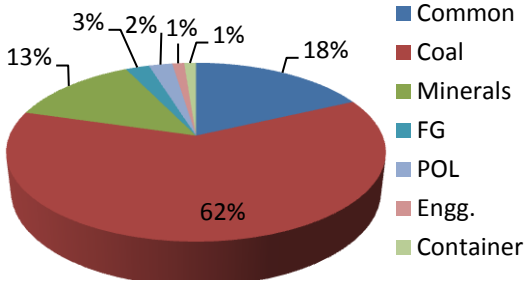
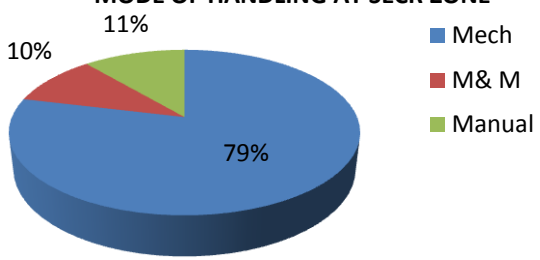


FIGURE 3.11
MODE OF HANDLING AT SECR ZONE



East Central Railway (ECR):

FIGURE 3.12
TYPE OF SIDING AT ECR ZONE

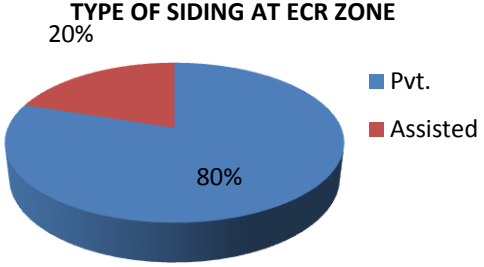


FIGURE 3.13
TYPE OF COMMODITY AT ECR ZONE

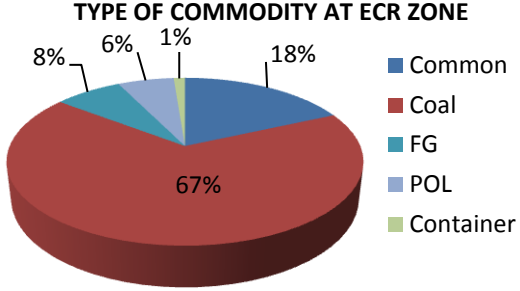
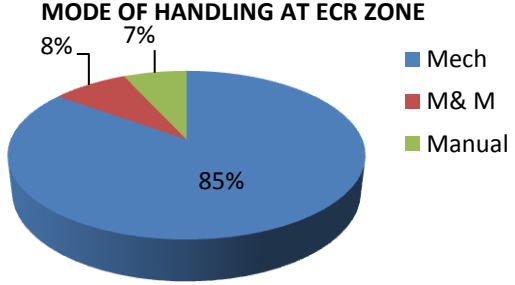


FIGURE 3.14
MODE OF HANDLING AT ECR ZONE



Northern Central Railway (NCR):

FIGURE 3.15
TYPE OF SIDING AT NCR

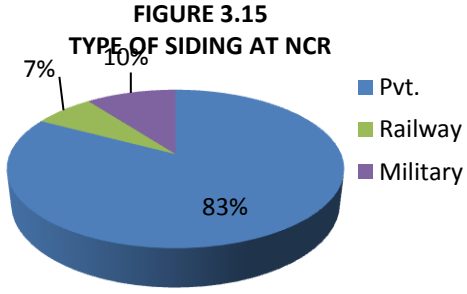


FIGURE 3.16
TYPE OF COMMODITY AT NCR

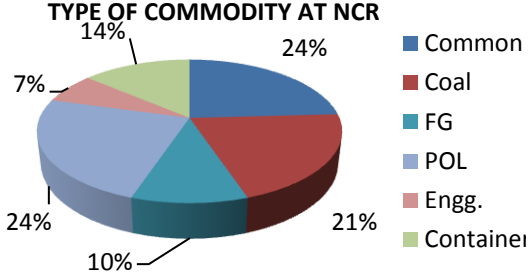
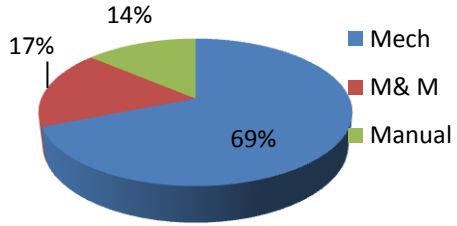


FIGURE 3.17
MODE OF HANDLED AT NCR ZONE



South Central Railway (SCR):

FIGURE 3.18
TYPE OF SIDING AT SCR ZONE

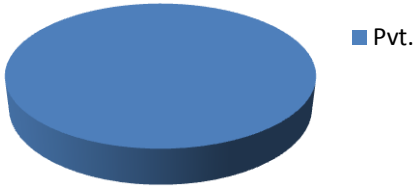


FIGURE 3.19
TYPE OF COMMODITIES AT SCR ZONE

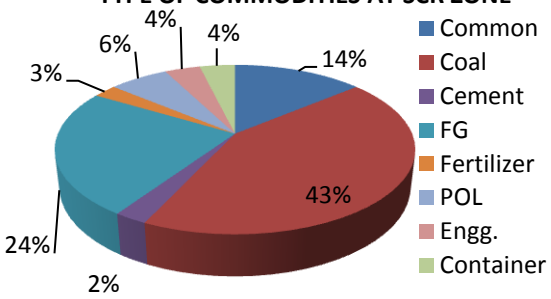
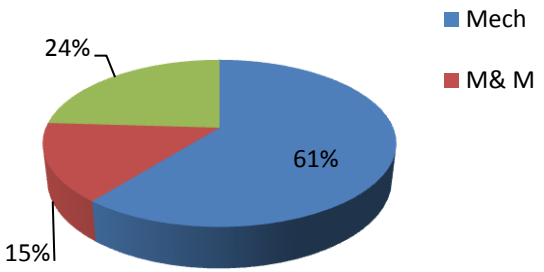


FIGURE 3.20
MODE OF HANDLING AT SCR ZONE



West Central Railway (WCR):

FIGURE 3.21
TYPE OF SIDING AT WCR ZONE

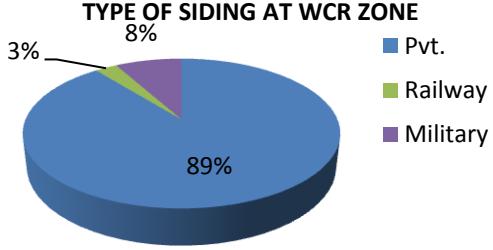


FIGURE 3.22
TYPE OF COMMODITIES AT WCR ZONE

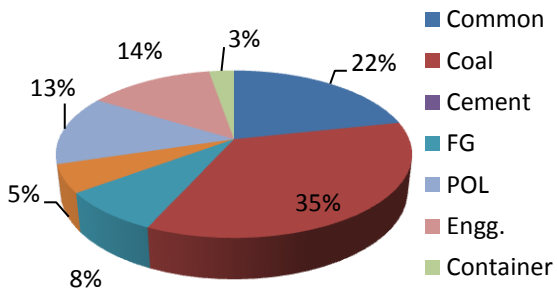
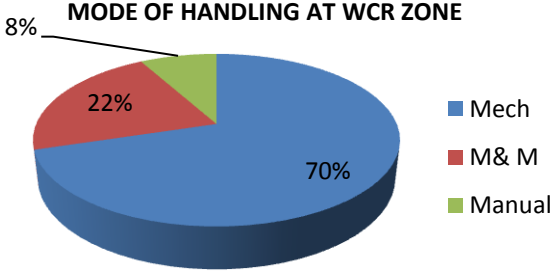


FIGURE 3.23
MODE OF HANDLING AT WCR ZONE



Central Railway (CR):

FIGURE 3.24
TYPE OF SIDING AT CR ZONE

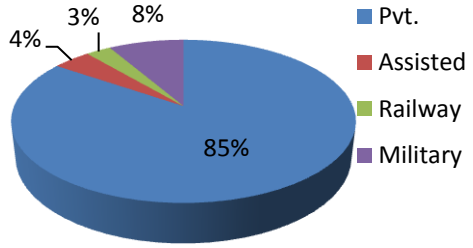


FIGURE 3.25
TYPE OF COMMODITIES AT CR ZONE

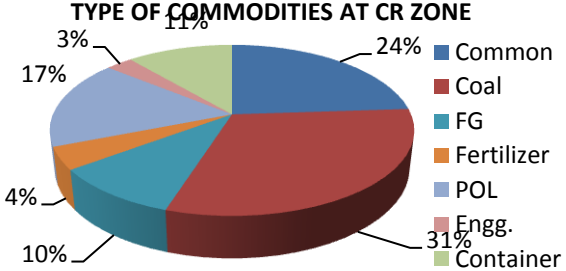
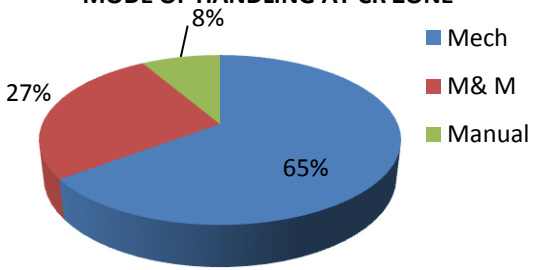


FIGURE 3.26
MODE OF HANDLING AT CR ZONE



Western Railway (WR):

FIGURE 3.27
TYPE OF SIDING AT WR ZONE

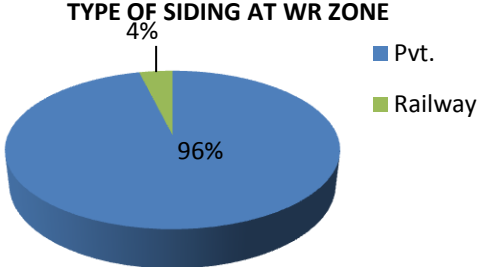


FIGURE 3.28
TYPE OF COMMODITIES AT WR ZONE

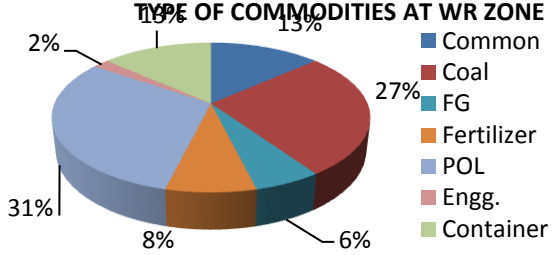
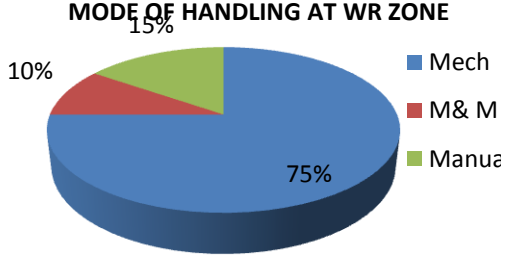


FIGURE 3.29
MODE OF HANDLING AT WR ZONE



South Western Railway (SWR):

FIGURE 3.30
TYPE OF SIDING AT SWR ZONE

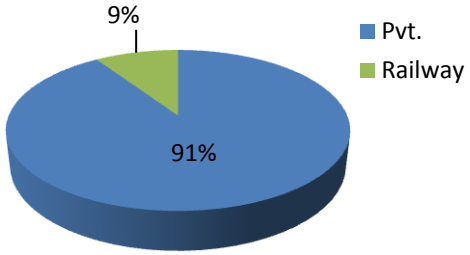


FIGURE 3.31
TYPE OF COMMODITIES AT SWR ZONE

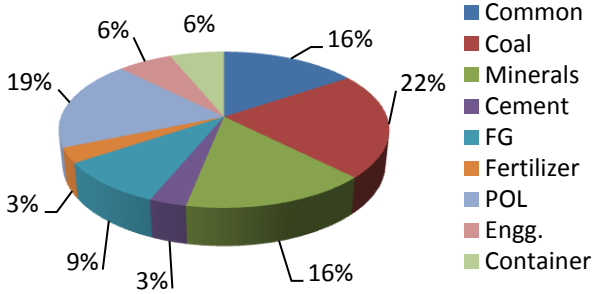
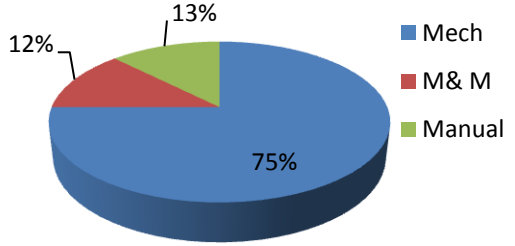


FIGURE 3.32
MODE OF HANDLING AT SWR ZONE



North Western Railway (NWR)

FIGURE 3.33
TYPE OF SIDING AT NWR ZONE

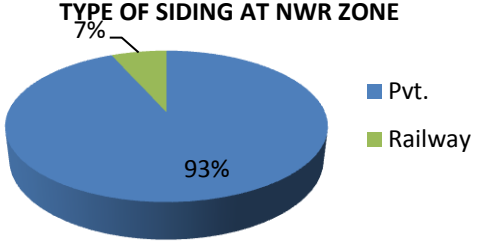


FIGURE 3.34
TYPE OF COMMODITIES AT NWR ZONE

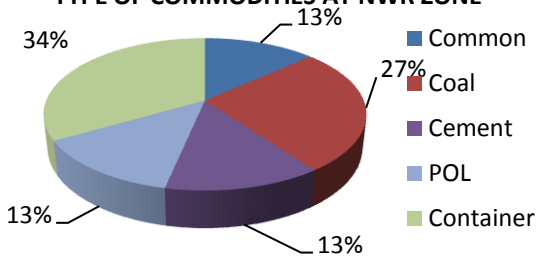
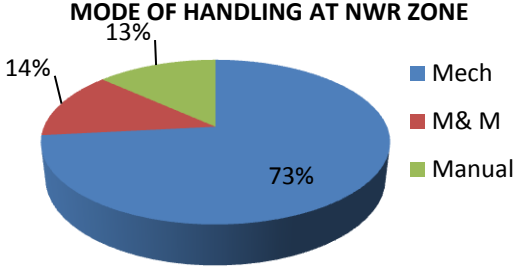


FIGURE 3.35
MODE OF HANDLING AT NWR ZONE



Northern Railway (NR):

FIGURE 3.36
TYPE OF SIDING AT NR ZONE

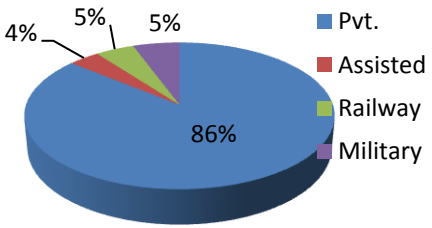


FIGURE 3.37
TYPE OF COMMODITIES AT NR ZONE

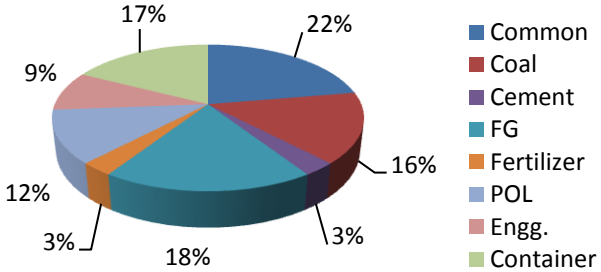
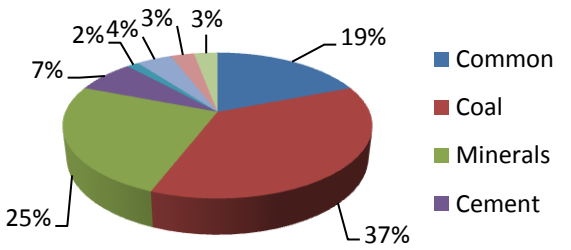


FIGURE 3.38
TYPE OF COMMODITIES AT NR ZONE



Southern Railway (SR):

FIGURE 3.39
TYPE OF SIDING AT SR ZONE

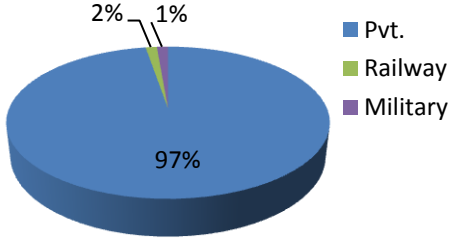


FIGURE 3.40
TYPE OF COMMODITIES AT SR ZONE

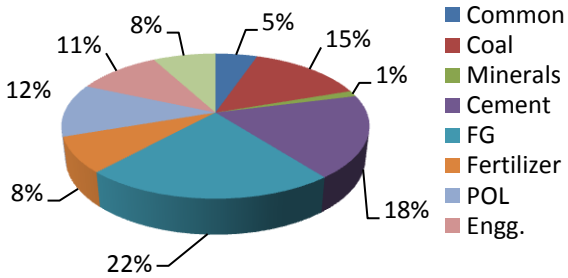
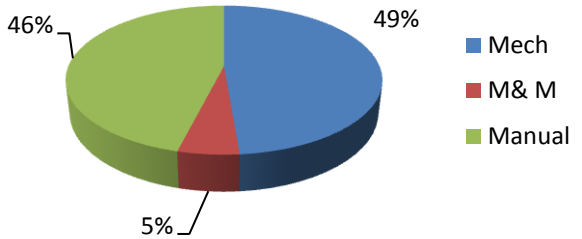


FIGURE 3.41
MODE OF HANDLING AT SR ZONE



South Eastern Railway (SER)

FIGURE 3.42
TYPE OF SIDING AT SER ZONE

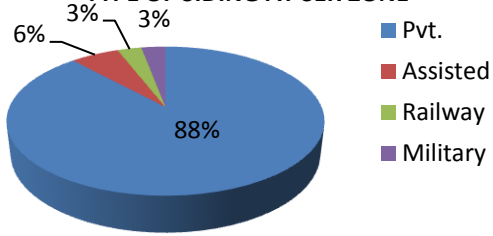


FIGURE 3.43
MODE OF HANDLING AT NR ZONE

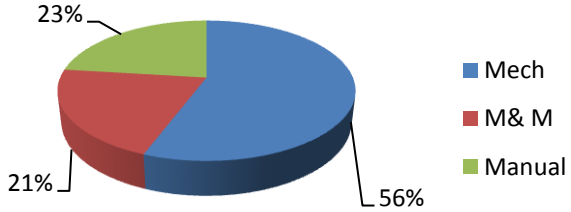
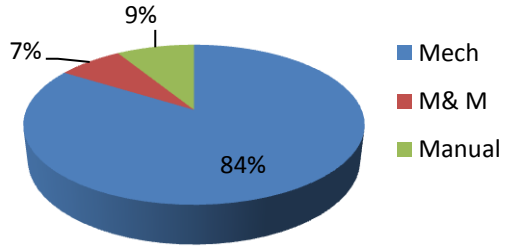


FIGURE 3.44
MODE OF HANDLING AT SER ZONE



Northeast Frontier Railway (NFR):

FIGURE 3.45
TYPE OF SIDING AT NFR ZONE

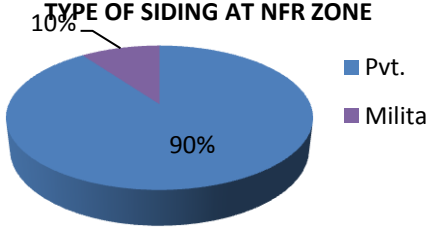


FIGURE 3.46
TYPE OF COMMODITIES AT NFR ZONE

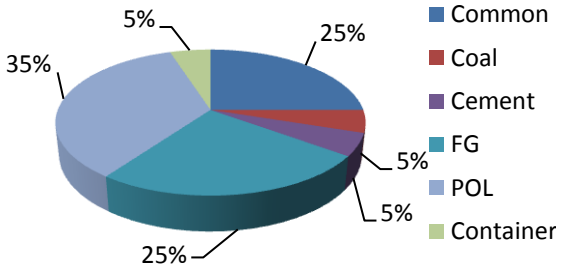
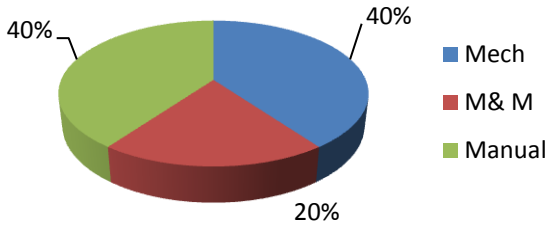


FIGURE 3.47
MODE OF HANDLING AT NFR ZONE



East Coast Railway (ECOR):

FIGURE 3.48
TYPE OF SIDING AT ECOR ZONE

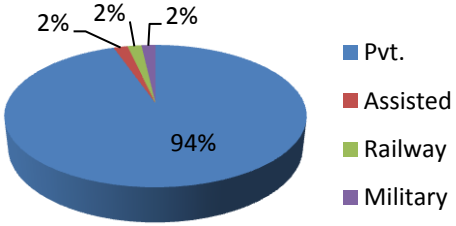


FIGURE 3.49
TYPE OF COMMODITIES AT ECOR ZONE

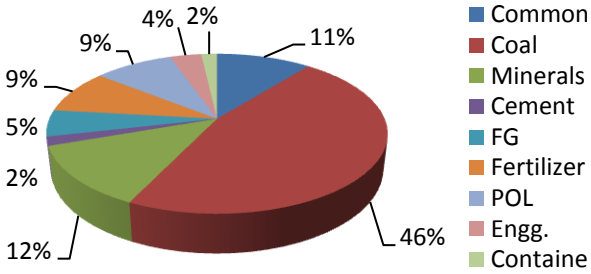
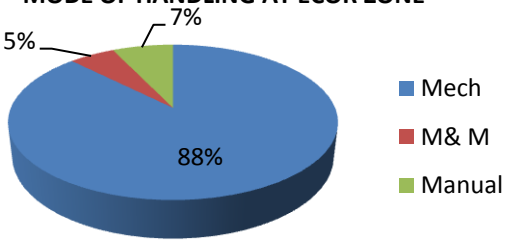


FIGURE 3.50
MODE OF HANDLING AT ECOR ZONE



Eastern Railway (ER):

FIGURE 3.51
TYPE OF SIDING AT ER ZONE

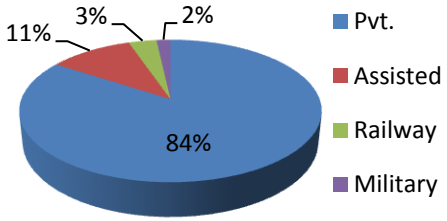


FIGURE 3.52
TYPE OF COMMODITIES AT ER ZONE

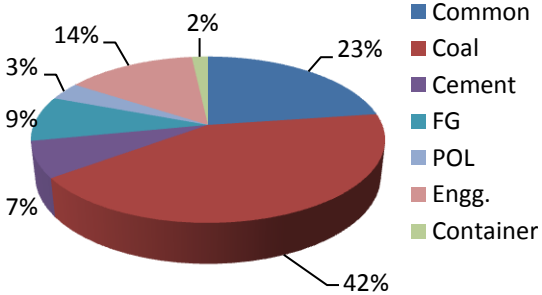
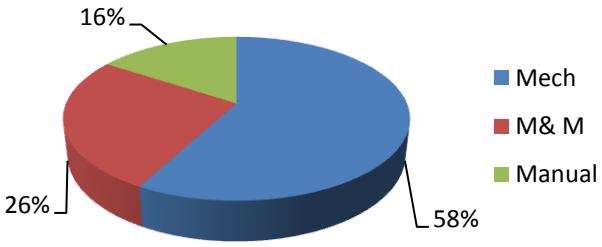


FIGURE 3.53
MODE OF HANDLING AT ER ZONE



North Eastern Railway (NER):

FIGURE 3.54
TYPE OF SIDING AT NER ZONE

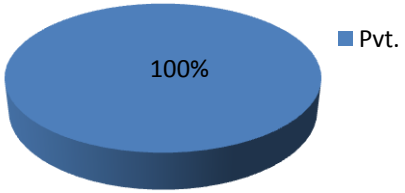


FIGURE 3.55
TYPE OF COMMODITIES AT NER ZONE

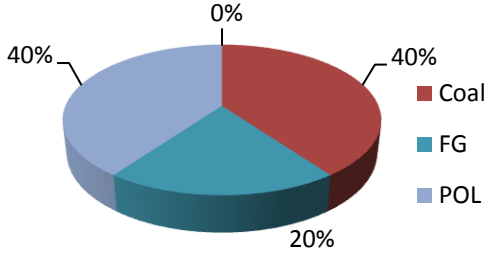
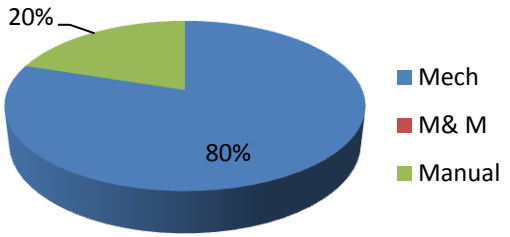


FIGURE 3.56
MODE OF HANDLING AT NER ZONE



3.4.5 Goodshed

The number of Goods sheds in a Zone is given in **Table-3.3**. There are 503 numbers of Goodsheds operational in India. The maximum number of goods sheds is 101 in Northern Zone and minimum 9 in North Eastern Zone.

Table-3.3: Summary of Goodsheds (Zonewise)

Sr.No.	Zonal Railway	Headquarter	No. of sidings
1	Central Railway	Mumbai(CSTM)	28
2	Western Railway	Mumbai(CCG)	35
3	Southern Railway	Chennai	43
4	Eastern Railway	Kolkata	37
5	Northern Railway	New Delhi	101
6	East Central Railway	Hazipur	29
7	East Coast Railway	Bhubneshwar	18
8	North Central Railway	Allahabad	19
9	North Eastern Railway	Gorakhpur	9
10	Northeast Frontier Railway	Maligaon(Guwahati)	14
11	North Western Railway	Jaipur	11
12	South Central Railway	Secundrabad	55
13	South Eastern Railway	Kolkata	28
14	South Western Railway	Hubli	27
15	South East Central Railway	Bilaspur	33
16	West Central Railway	Jabalpur	16
17	Kolkata Metro	Kolkata	Nil

The type of goodshed and mode of handling with respect to zone is analyzed and presented in **Figure 3.57** to **Figure 3.86**. **It is observed that about 82 % of goods shed are handling all materials except POL i.e. common good shed followed by coal handling good shed of 7%. The mode of handling is maximum i.e. 66% both by mechanical & manual followed by 18% manual. The mechanical mode of handling is 16%.**

FIGURE 3.65
COMMODITY HANDLIED AT GOODSHED IN WCR

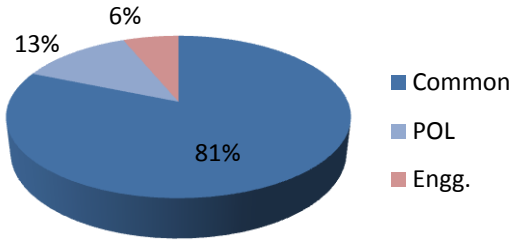


FIGURE 3.66
MODE OF HANDLING AT GOODSHED IN WCR

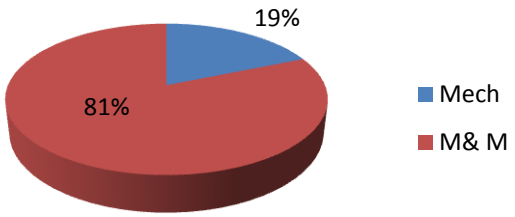


FIGURE 3.67
COMMODITY HANDLED AT GOODS SHED IN CR

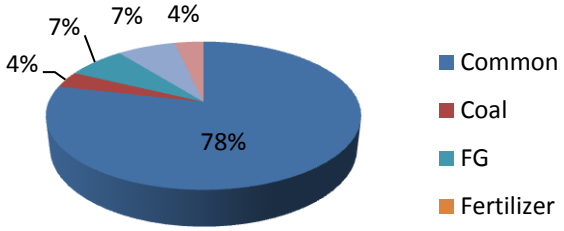


FIGURE 3.68
MODE OF HANDLING AT GOODS SHED IN CR

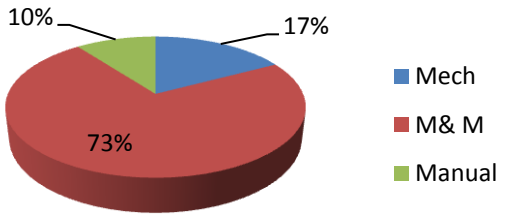


FIGURE 3.69
COOMODITY HANDLED AT GOOS DSHED IN WR

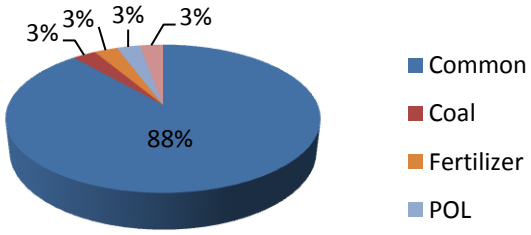


FIGURE 3.70
MODE OF HANDLING AT GOODS SHED IN WR

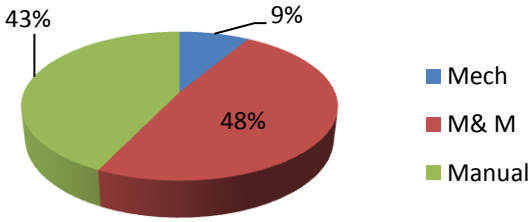


FIGURE 3.71
COMMODITY HANDLED AT GOODS SHED IN SWR

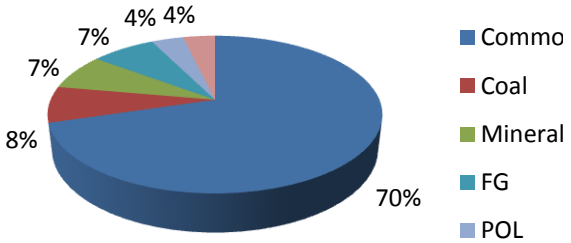


FIGURE 3.72
MODE OF HANDLING AT GOODS SHED IN SWR

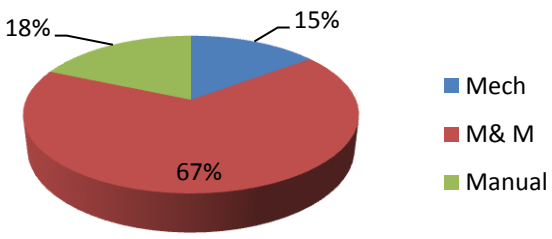


FIGURE 3.73
COMMODITY HANDLED AT GOODS SHED IN NWR

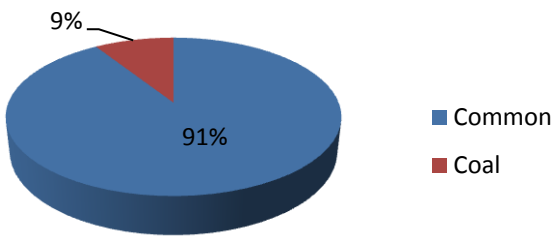


FIGURE 3.74
MODE OF HANDLING AT GOODS SHED IN NWR

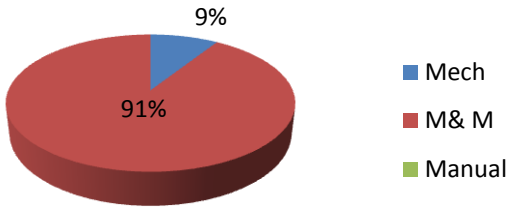


FIGURE 3.75
COMMODITY HANDLED AT GOODS SHED IN NR

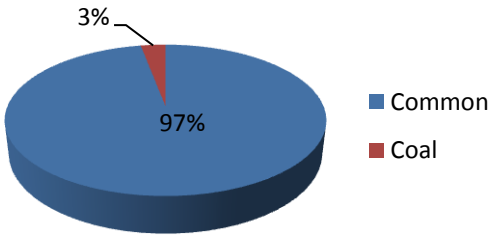


FIGURE 3.76
MODE OF HANDLING AT GOODS SHED IN NR

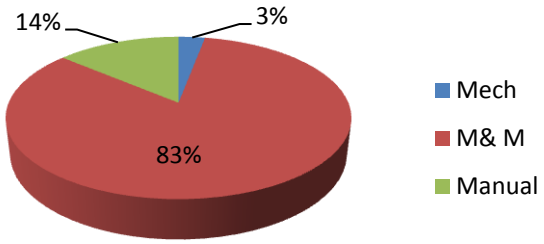


FIGURE 3.77
COMMODITIES HANDLED AT GOODS SHED IN SR

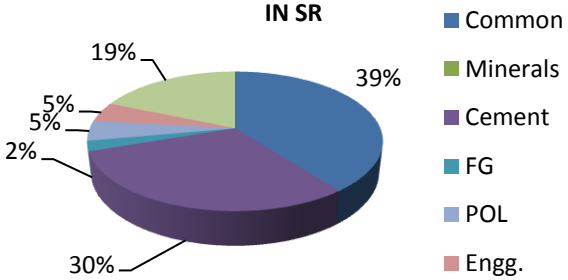


FIGURE 3.78
MODE OF HANDLING AT SR GOODS SHED IN SR

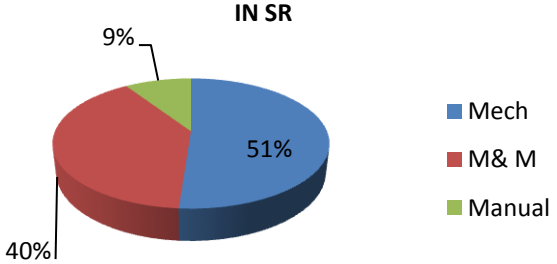


FIGURE 3.79
COMMODITIES HANDLED AT GOODS SHED IN NFR

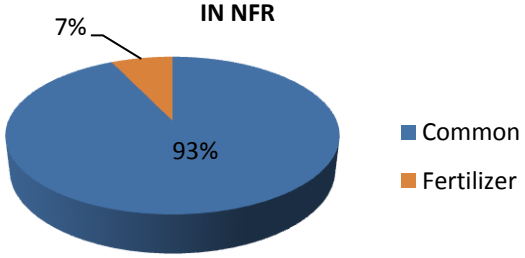


FIGURE 3.80
MODE OF HANDLING AT GOODS SHED IN NFR

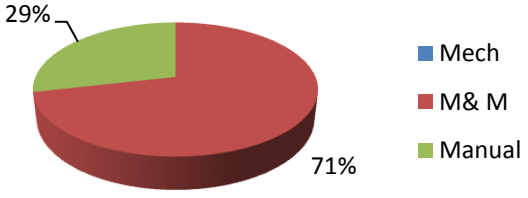


FIGURE 3.81
COMMODITIES HANDLED AT GOODS SHED IN ECOR

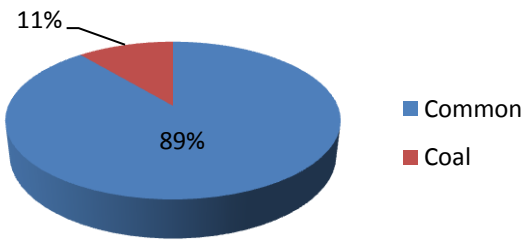


FIGURE 3.82
MODE OF HANDLING AT GOODS SHED IN ECOR

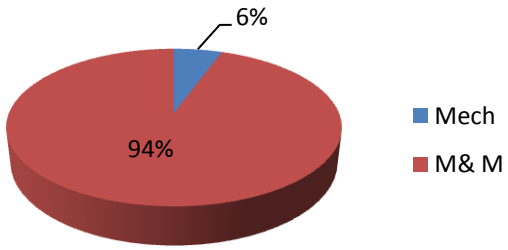


FIGURE 3.83
COMMODITIES HANDLED AT GOODS SHED IN ER

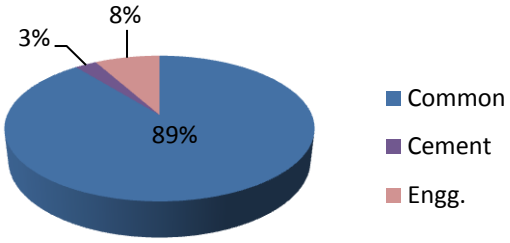


FIGURE 3.84
MODE OF HANDLING AT GOODS SHED IN ER

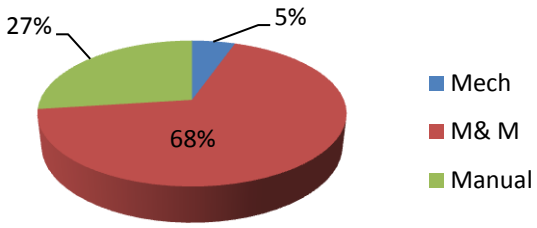


FIGURE 3.85
COMMODITIES HANDLED AT GOODS SHED IN NER

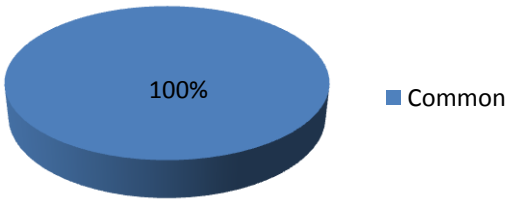
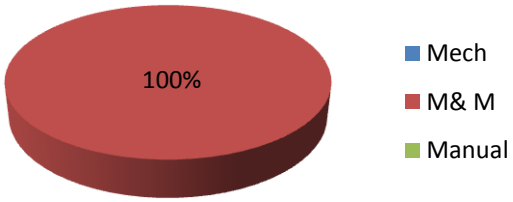


FIGURE 3.86
MODE OF HANDLING AT GOODS SHED IN NER



3.4 PRIVATE FREIGHT TERMINALS (PFT)

As a part of marketing strategy IR has initiated the PFT scheme for existing siding owners or Green Field projects. To attract the bulk road traffic of more than 300 km distance, this was shifted to road due to different railway operational and marketing constraints. Private Freight Terminal scheme had been launched by Indian Railway on 31.05.2010 to help rapid development of a network of freight terminals with private investment for efficient and cost effective logistics services with warehousing solution to end users. PFT can either be 'green field' facilities developed by private parties on private land or 'brown field' facilities, i.e. existing private sidings/container terminals on private land which can be permitted to be converted to private freight terminals under the provisions of the scheme. The scheme will facilitate traffic handling at the terminals by private investors thereby increasing IR's market share.

3.5 SELECTION OF SITE FOR FIELD STUDY

Project team visited zones for the identification and selection of site within that zonal area. The data has been collected for each siding in that zone. The selection of best site for field study was majorly based on the administrative approval from concerned authority to visit the site. The other important aspect for selection of site for field visit was also based on the commodity and the importance of the siding with quantum of loading and unloading.

3.7 FIELD STUDY DATA

The collection of field study data was based on the field observation, questionnaire and meetings with key persons of the siding . The data available and observed during site visit was collected in the form of questionnaire. While most of the data in terms of water requirement and pollution at site from solid waste, POL waste, dust generation etc were not available at siding site. However the project team has made utmost efforts to collect the data through observation and meetings.

About 55 sidings have been visited as part of field study. The pollution source like dust, solid waste & POL waste has been studied/ assessed during visit & meetings with key persons at siding. The implementation of pollution measures at site was also been observed. The handling modes of commodities were studied to understand the process of loading & unloading. **Annexure-3.1** presents compilation of the field studies carried out at **55 sidings visited during the study**

Different types of siding visited during the study is presented in **Figure 3.87**. The commodities handled at sidings are graphically presented in **Figure 3.88**. The pollution intensive commodities are coal, cement and other loose commodities. The most number of sidings selected for field study were coal followed by cement.

Figure 3.87
Type of siding visited

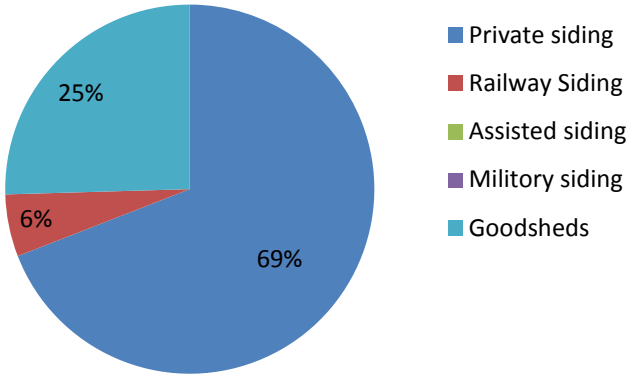
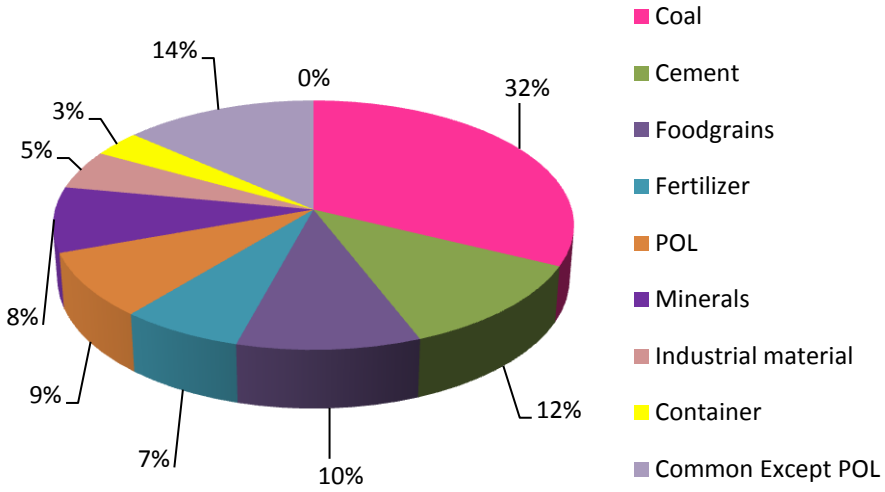


Figure 3.88
Commodities Handle at visited Siding



It can be seen from the graph that, **about 32% of sidings visited & studied were coal handling followed by 14% common commodities (except POL) and 12% of cement**. The coal & cement were found to be the most dust polluting commodities. Food grains, Fertilizer, Minerals & POL were less pollution intensive. Industrial & container handling at sidings were less visited siding due to having packaged loading & unloading.

The method of loading and unloading plays vital role in generation of pollution. The loading and unloading has been broadly classified in to manual and mechanical. The manual loading and unloading is carried out through head loads and pulled trolleys. However, mechanical loading and unloading are carried out through various mechanical driven equipments. The type of mechanical loading and unloading equipments is based on the type of commodity to be handled. The types of loading and unloading activities observed during site visit have been examined and presented in the **Figure 3.89**.

FIGURE 3.89

COMMODITY HANDLING ARRANGEMENT AT VISITED RS

CHAPTER – 4

COAL SIDINGS

The environmental impacts have been assessed on the basis of observations made during visits to the selected railway sidings. The quantitative prediction of impacts are not covered in the report, however qualitative impacts which were observed during visits have been assessed and presented in the subsequent section. The impacts identified through observations are broadly classified under air environment, water environment and solid waste etc. The qualitative impacts identified assisted in delineation of suitable environmental management plan required for the mitigation of the adverse impacts on environment in and around the area.

Most of the commodities are in the packed form except materials like coal & minerals. The loose materials create nuisance of dust pollution, hence more attention is given to the loose materials. It was observed during field visits that the coal handling sidings are more prone to dust pollution as compared to other commodities. The same has also been confirmed through available literatures and reports. No record of monitoring quality for air, water and solid waste were available at visited sidings.

The severity of impacts on air environment from coal handling sidings is governed by terrain as well as meteorological conditions. Coal handling sites are associated with several onsite facilities such as coal handling system (loading & unloading), sprinkling system and haul road. The impacts on air quality from coal handling depend on coal handling technology, its operation & maintenance as well as transportation of coal. The pollution is due to coal handling activities at storage yard, wind erosion, loading/ unloading operation and from haul road etc. The impacts due to commodities especially coal & mineral have been identified and discussed in details for the major source of impacts on environment broadly however, the other commodities are discussed briefly.

4.1 EXISTING OPERATION SYSTEM

The number of coal handling siding visited were 19, out of which the operation at 17 is mechanical and at two locations the operation was manual. The numbers of visited coal handling siding are given in the **Table 4.1**. The process of coal handling, pollution due to handling and available measures to control pollution within siding area is described in the following sections.

TABLE 4.1 COAL SIDINGS VISITED

Sl	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
1	Panipat Thermal Power Plant, Panipat	NR	Coal	Tippling	Not Available	Yes	No	No	PM	SS	• Dust Suppression (water sprinkle) • Underground water tank • 50 trees
2	Paradip Port Trust	ECOR	Coal	Conveyer Belt loader	5000 lit/day	Yes	No	No	PM	SS	• Coal Heap covered by plastic sheets • High rise nets used at boundary wall for dust control
3	IMFA (Indian Metals & Ferro Alloys Ltd)	ECOR	Coal	Conveyer Belt	Not Available	Yes	No	No	PM	SS	• Dust Suppression • Tree Plantation
4	Associated Cement Co. Secundarabad	SCR	Coal, Cement	Conveyer Belt, Manual	1000 lit/day	Yes	No	No	PM	SS	• Scattered plantation
5	NTPC Ltd, Ramagundam	SCR	Coal, POL	Conveyer Belt	5000 lit/day				--	SS, O&G	• Water Sprinkler
6	Godavari Khan No.6, Ramagundam	SCR	Coal	Conveyer Belt	1500 lit/day	Yes	Yes	No	PM	SS	
7	Kankaria	WR	Coal	Manual	250 lit/day	Yes	Yes	No	PM	SS	
8	Electric Power House Sabarmati, Ahmadabad	WR	Coal	Mechanical	2500 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkler
9	Dhanbad	ECR	Coal	Mechanical	2000 lit/day	Yes	Yes	No	PM	SS	
10	Panari Dalla siding, Salai, Banwa, Dhanbad	ECR	Coal	Mechanical	2500 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkling through tanker
11	Sendra Bansjora Colliery Bansjora, Dhanbad	ECR	Coal	Mechanical	Not Available	Yes	No	No	PM	SS	
12	Dobari No.2 Colliery, Dhanbad	ECR	Coal	Mechanical	2500 lit/day	Yes	No	No	PM	SS	• Water Sprinkling through tanker
13	Sijna stalding Colliery,	ECR	Coal	Mechanical	3000 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkling through

	Sijna, Dhanbad										tanker
14	CRC Railway Siding, Chandrapur	CR	Coal	Mechanical		Yes	Yes	No	PM	SS	• Water Sprinkling through sprinklers • Silo
15	Amarkantak Thermal Power Station, Amlai, Bilaspur	SECR	Coal	Mechanical	5000 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkler
16	Manikpur Collery Siding	SECR	Coal	Mechanical	2000 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkler
17	Kusumbi (KHM)	NER	Coal	Manual	5000 lit/day	Yes	--	No	PM	--	•
18	Damagaria, Asansol	ER	Coal	Mechanical	2500 lit/day	Yes	--	No	PM	--	• Water Sprinkler
19	Bonjemari, Asansol	ER	Coal	Mechanical	100 lit/day	Yes	--	No	PM	--	•

4.1.1 Operating System

At most of the places in India, coal loading/unloading is either done by means of JCB, moving loading arm system, silos and Tippling system. If coal is being transported to sidings through trucks or dumpers, it is stored at designated place near loading and unloading area to facilitate easy loading. The coal is then lifted from stack yard through JCB and lower into wagon. The **Figure 4.1** shows the operation of loading the wagons through JCB. The moving loading arm is also used for direct loading of coal in wagons. The **Figure 4.2** shows the movement of moving loading arm. The pollution scenario is almost same in loading as well as unloading through JCB. If siding is located near coal mine, the coal is being transported through conveyor belt system and lowered directly in to wagon from top. The whole system of loading the wagon is termed as Silo system. The photographs showing Silo system is shown in the **Figure 4.3**.

In the Tippling system for unloading, the coal load along with wagon is tilted mechanically and emptied on the open tank on the other side. From open tank the coal moves further through conveyor belt system. **Figure 4.4** shows the operation of Tippling System.

FIGURE 4.1
LOADING OF COAL THROUGH JCB

FIGURE 4.2
OPEARTION OF MOVING LOADING ARM

FIGURE 4.3
SILO SYSTEM

FIGURE 4.4
TIPPLING SYSTEM

4.1.2 Pollution

The intensity of dust pollution depends upon the coal handling systems. The sources of pollution in the coal handling process are attributed to operation system (i.e. loading and unloading), storing system (stockpile erosion) and transit of coal (haul roads) within siding area. It was observed during field visit that each operating system has different pollution scenario.

4.1.2.1 Pollution due to Operating System

The activity of coal lifting from stockpile and loading in wagons was observed as most polluting exercise. During lifting of coal by JCB from stockpile and lowering of coal to wagon, the loose particle (dust) of coal spreads in the air during lowering. Also coal particles spread in air due to wind. The dispersion of coal dust particles depends upon the wind speed and direction. The pattern of pollution was same in moving loading arm system. In the Tippling system, the source of pollution was at the time of lowering of coal in the conveyor belt. During this operation, spreading of dust is limited to nearby area. Dust pollution due to loading and unloading is shown in **Figure 4.5** and **Figure 4.6**.

In silo system, the coal is watered at mine itself at the time of entering conveyor belt. The water sprinkler is installed at the end of conveyor belt during lowering of coal in wagon. The source of pollution is due to faulty water sprinklers and drop height of coal in wagons. The drop height can be major source of pollution. It was observed that the dust pollution at silo system is less as compared to other handling process.

FIGURE 4.5

DUST POLLUTION DUE TO LOADING BY JCB

The majority of the freight traffic of coal is being transported by open wagons. The coal loaded in open rack is shown in **Figure 4.7**. Dispersion of coal dust takes place

due to uncovered wagons beyond the siding area during transportation which was beyond the scope of the present study.

FIGURE 4.6
COAL DUST DEPOSITION AT TIPPLING SYSTEM

FIGURE 4.7
COAL LOADED OPEN RACK

4.1.2.2 Wind Erosion from Stockpile

Coal is temporarily stored at a proposed elongated conical stockpile before it is carried through the train wagon. Stockpiles of coal provide a surface for the generation of wind-eroded material and subsequent propagation of particulate matter. In addition to size of stockpile, dust spreading is also dependent on the frequency of disturbance of the exposed surface. However, stockpiles are frequently disturbed, causing fresh surface material to be exposed. Watering is the principal means of dust suppression for active stockpiles. Generally, the stockpiles are

watered through water spraying system. No fixed system of sprinkling water to the stockpile was noticed at sidings. The stockpiling at sidings is shown in **Figure 4.8** and **Figure 4.9**.

FIGURE 4.8
STOCKPILING AT SIDING

FIGURE 4.9
STOCKPILING AT SIDING

4.1.2.3 Haul Road

During field visits it was observed that, the approach roads (haul road) at almost all the siding were found in bad condition. The utmost nuisance of dust spreading happened due to the movement of coal traffic on the road. The particulate matter (coal dust) which is already settled on the roads gets distured due to movement of

wheels and causes resuspension of the coal dust in the air during vehicular movement. Approach roads for the sidings were found to be dustier and not well maintained. The trucks/dumpers carrying coal from quarries to the siding were uncovered creating dust pollution. The dispersion of dust particles due to the wheels of vehicles on haul road is major source of pollution. The most of the literatures and reports indicate that haul road dust pollution is the serious problem and needs to take up on priority basis. The intensity of dust dispersion due to wheels of carrier depends upon the type of road (paved and unpaved), the dust suppression system and maintenance of roads (sweeping). The most of the coal handling sidings and the haul roads were unpaved except the large coal handling sidings at Power Plants and Ports. It was also noticed that at large coal handling sidings, the roads were paved but not maintained. The dust is hazardous to human health. It not only creates nuisance inside the siding but also creates nuisance outside the siding area. It is observed during the visits that the ambient air along the haul road was found hazed. The hazed atmosphere at sidings is seen in the **Figure 4.10** and **Figure 4.11**.

FIGURE 4.10

COAL DUST FORMATION IN TRANSIT OF COAL

FIGURE 4.11
COAL DUST FORMATION IN TRANSIT OF COAL

4.1.3 Treatment System

The treatment system available at siding for air, water and solid waste are described at sections ahead.

4.1.3.1 Dust Suppression

The dust suppression system through water sprinkling, chemical suppressant and covering material are the general systems used worldwide. However, in India water sprinkling and covering the stockpile are the common system used. The mechanically operated sprinkling system were noticed only at large coal handling sidings like power plant and ports, however at low coal traffic, the water tankers are used to facilitate the suppression of coal dust before loading. The water sprinkling system in which water is sprinkled directly over the wagons are exists at nine sidings however at rest of the sidings the dust is suppressed through water tankers. The water sprinkling system, before the coal unloaded through tippling system is shown in **Figure 4.12**. The water is sprinkled over the top open end of wagon to suppress the dust during operation of unloading. The **Figure 4.13** shows the water tanker used for the suppression of coal dust. The places, where sprinkling system before unloading was not available, the dust particle settles near Tippling facility.

Besides having provisions of water sprinkler, the siding was still causing nuisance in and around the area. These may be due to negligence in implementation of existing system and lack of adequate infrastructure facilities at siding.

FIGURE 4.12
WATER SPRINKLING SYSTEM

FIGURE 4.13
WATER TANKER FOR SUPRESSION OF COAL DUST

4.1.3.2 Wind Screen

Wind breaks and screens offer an alternative to reduce wind erosion from stockpiled materials or areas having no vegetative cover. The effectiveness of wind screen depends upon the wind speed, height, orientation and distance from stockpile. In developed countries, chemical binders and suppressants are applied to the surface of stockpiles to enhance the cohesion of particles and reduce the potential for wind erosion. These binding agents are usually applied in solution and are sprayed onto the surface of stockpile. During field visits, the wind screen system was observed only at Paradip Port Trust. The wind screen was found under construction. The photographs showing wind screen at paradip port is in **Figure 4.14**.

FIGURE 4.14
WIND SCREEN AT PARADIP PORT TRUST

4.1.3.3 Waste Water Collection System

The waste water generation due to water sprinkling system & water sprinkling by tankers needs proper water collection system. It was observed during field visits that, the proper drainage network system hardly exists at any railway sidings. Those having drainage system were found in choked condition. No significant attention was given to the waste water collection and disposal. Some of the drainage networks at sidings are shown in **Figure 4.15 & 4.16.** Due to improper drainage network, the water is not getting reused. The water logged area near siding is shown in **Figure 4.17**. Due to lack of treatment system, the waste water enters in to the surrounding area thereby contaminating the surface as well as ground water source.

FIGURE 4.15
INADEQUATE WASTE WATER COLLECTION SYSTEM

FIGURE 4.16
CHOKED CONDITION OF WASTE WATER COLLECTION SYSTEM

FIGURE 4.17
WATER LOGGED AREA

4.1.3.4 Solid Waste Disposal System

There are two types of solid waste generated at the siding i.e. domestic waste and commodity leak waste. The domestic waste is being generated by operating staff while commodity waste is generated through leakage during storage and loading/unloading operation. At all the coal sidings the waste generated by operating staff is found disposed off through un-channeled way. No record of quantity and quality of waste generated was found during field visit. As discussed with the siding In-charge, the coal dust which generated during loading and unloading is valuable resource and is utilized within the plant or auctioned. Especially in case of coal handling at Thermal Power Plant, the coal dust has been utilized within the plant. The coal dust other than Power Plant, is auctioned. No record of domestic solid waste generation w.r.t quantity and quality was found at sidings.

4.1.3.5 Vegetation

The dust generated during loading and unloading consists of heavy as well as light particles. Heavy particle settles down within the premises while light particle settles on the land nearby. The dust particles due to stockpile are restricted to spread by thick green belt. During field visit it was observed that about 25% of siding have plantation. Some scattered natural trees were found within the siding areas and outside the boundary. The sidings without green cover are shown in **Figure 4.18** and **Figure 4.19**. The photographs showing green belt are shown in **Figure 4.20** and **Figure 4.21** respectively.

FIGURE 4.18
RAILWAY SIDING WITHOUT GREEN COVER

FIGURE 4.19
RAILWAY SIDING WITHOUT GREEN COVER

FIGURE 4.20
RAILWAY SIDING WITH PLANTATION

FIGURE 4.21
RAILWAY SIDING WITH GREEN BELT

4.2 ENVIRONMENTAL MANAGEMENT PLAN FOR COAL SIDING

An attempt has been made to develop the management plan on the basis of observations, assessments, available data and discussion made during field studies. Some impacts which were not identified during field visit due to unseen and unreported activities were also included for completeness of Environmental Management Plan.

4.2.1 Air Pollution Control

Dust control plan for loading and unloading mostly requires at coal, mineral and loose materials handling sidings. The dust control plan for various activities at siding is described below followed by best practice available.

4.2.1.1 Loading & Unloading: The intensity of dust pollution largely depends on the loading and unloading process at siding which has significant impact on environment. The adoption of following practice will provide significant control on dust pollution:

- An independent water spraying system should be established at coal handling sidings before loading and unloading of coal.
- Water spraying system should involve surface water tanks, network of spray water pipeline and headers.
- Providing mobile and static water sprinkler system wherever above is not possible,
- Water should be sprayed in the form of fine jet to suppress the dust generated while loading and unloading operations,

- The drop height should remains minimum as possible, in case of Silos operation,
- The coal received at siding from mines should have sufficient surface moisture to improve dust control during loading.

The best practice for loading and unloading coal commodity are described in the following section.

Coal Loading: The coal loading in India is carried out manually by volumetric loading system and batch weigh loading. The volumetric and batch weigh methods of loading are useful for large scale operation. In the volumetric loading system, loading is carried through covered enclosure i.e. Silos with conveyer system. "Silo" means a tall structure, usually cylindrical and of reinforced concrete construction, in which bulk material is stored and they are discharged through feeders at the bottom. This is environment friendly, safe and offer a high degree of automation. The dust emissions are eliminated and no water spraying is necessary. The silos are the best practiced method to restrict the dust. Silos are also used for minerals, Gypsum and food-grains. The **figure 4.22** shows typical Silos system. The following features of the silos help followed to control the dust.

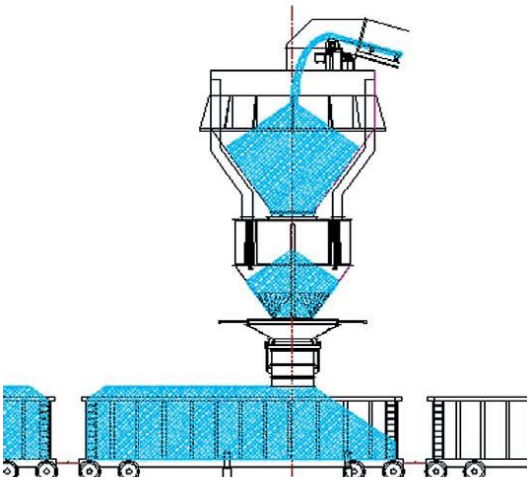
- The silos are cylindrical and fed by belt conveyors,
- The loading operation of the coal rake takes place with designated speed,
- For accurate weighing of coal to each wagon,
- Load cells are provided with silos.

The Batch Weighing Loading System is the only type of train loading facility that prepares the material specifically for each wagon of a train so that maximum wagon utilization is achieved. Each wagon is loaded in such a way that it is neither overloaded nor under loaded. This helps in prevent excessive damage to the facilities and equipment and the producer utilizes each wagon's capacity efficiently. The Batch Weighing Loading System works through the use of a two-bin system under the common structure. The surge bin situated in the structure over the top of the weigh bin, is situated over the top of the railroad tracks where wagons are to be loaded. Through computer control, a series of high speed hydraulically actuated weigh bin feed gates transfers the material from the upper surge bin into the weigh bin until the desired net target weight for the wagon to be loaded is achieved. The high accuracy in material loss control and low maintenance will lead to less dust pollution from the batch weighing systems. The **Figure 4.23** shows Batch Weighing Loading System.

Coal Unloading: Coal unloading through tippling is the best operating system to control dust. With the rotary tippler, the wagon is gripped by hydraulically operated clamps within a frame mounted to circular end rings supported on rollers with a rack and pinion style drive. This allows the wagon to be rapidly inverted and the coal or raw material discharged to a hopper below. The tippling system and water sprinkling system before unloading will be the best combination for dust control.

FIGURE 4.22
SILOS

FIGURE 4.23
BATCH WEIGHING SYSTEM



Wind Dust Network is an important application of dust protection. This is a wall structure erected along the boundary specially restricting stockpile for dust erosion due to wind. Wind Dust Network is mainly used to prevent wind dust at coal storage places, coking plants, open-air stockyards, building materials, cement and other enterprises; power plants and other enterprise factories; and other harsh environments; coal yards of coal warehouse. The height of the wind dust wall generally restricted to 3-3.5 meters. It also depends upon the wind speed and wind direction. Single-layer mesh can prevent up to 65-85% of wind/dust, and double-layer mesh can prevent 95% wind dust. The material used for Wind Dust Network is available in steel plate, galvanized plate, colour coated sheet, stainless steel sheet and fibre reinforced plastics (FRP). Wind Dust Network is perforated and processed with high-pressure electrostatic powder for anti-corrosion. The main engineering advantages of wind dust network are (i) it can be readily formed, (ii) easy installation, (iii) it can be painted, polished or anodized, (iv) the thickness of materials is in wide range from 0.3 mm -8 mm, (v) large selection of hole patterns and configurations, (vi) uniform sound abatement, (vii) attractive appearance and (viii) effective efficiency of dust suppression of about 95%. The wind dust wall has been installed at Paradip Port Trust is shown in following photographs.

Storage: "Stockpile" means accumulation of material to create a reserve for loading or other purposes. The wind erosion of exposed areas causes significant emissions of particulate matter. The surface wind speed produces wind erosion which depends on the nature of the erodible material. Materials that contain minimal amounts of finer particles or that have a large proportion of larger particles will tend to be more resistant to major lift-off as materials that form a surface crust, whereas finer materials are characterized by relatively low surface wind speed thresholds for siltation, minor and major lift-off. The optimum restriction to wind erosion will be gained by adopting the following:

- Provide dust protection network i.e. wind screens all around the coal siding area for dust protection,
- Design of stockpile should be such that for maximum duration of year, air strikes the width of the stockpile and not the length.
- Stockpile design and management shall be such that materials can be safely stored and handled.
- The coal should be wet before stacking.
- Coal shall be stacked in trapezoidal shape and not in conical shape.
- Drains shall be provided around the stockpile with run off pit.
- Water sprinkling system all along the stockpile area should be established to protect the coal particles from erosion due to wind,

- The height of the stockpile should be less than the dust protective wall,
- Stockpiles may become sources of wind-generated dust hence these must be covered with polyethylene/canvas sheets during windy periods

Drains shall be provided around the stockpile with run off pit. The size of the pit should depend on the intensity of rainfall in the area and size of the stockpile. Pit shall be of RCC construction with a baffle wall in the middle. Coal particles in water collected in the pit settles down in the first compartment and relatively clear water flows to the second compartment. The water would be pumped from the second compartment to guard pond for further utilization. This coal is then dump in coal stockpile.

Generally water is applied to stockpiles for suppression of dust due to wind. Chemical suppressants can be applied to coal stockpiles to reduce the effects of wind erosion by binding the surface into a crust. The types and details of suppressants are described in the section below. There is number of local and international companies that sell suppressants into the market.

4.2.1.2 Haulroad

The most of the reviewed literatures and reports reveals that the major source of dust generation on haul roads is due to resuspension of the dust during vehicular movement. Hence, the major emphasis needs to be given for the management plan for improvement of haul roads. The management plan for minimizing haul road dust generation is as follows:

- An unpaved roads should be paved at the existing sidings,
- Higher grading of main haul roads and service roads to clear accumulated loose material,
- Regular sprinkling of water on haul roads for dust suppression,
- The chemical suppressant can be used at the water scarcity places,
- Truck body washing system before entering and outing from siding area
- The trucks carrying coal should be covered with the Tarpaulin. Strict action should be taken if the rules are not followed,
- The trucks carrying coal and other materials should not be filled to the top i.e. it should not be overloaded,
- Dust dislodgement from vehicular movement must be minimized by implementing speed limits,
- Vehicular movement at the siding area, shall be regulated effectively to avoid traffic congestion and to protect the workers from dust due to exposure in dusty environment,
- Emissions from the heavy duty vehicles operating in and out of siding shall follow the standard under Motor Vehicles Rules.
- Coal transport through conveyors within siding shall have to be done under enclosed conditions,
- Afforestation with dust filtering trees around railway siding area.

Dust emission from the various activities at siding is in the form of Particulate Matter PM_{10} and $PM_{2.5}$. The permissible limit for these parameters is given in the National Ambient Air Quality Standards, CPCB. All the air pollution parameters at sidings should comply with this standard. The National Ambient Air Quality Standard is given in the **Annexure 4.1**.

The best practice for control of dust generated due to traffic on haul roads are described at following section.

Sprinkling System for Haul roads: The sprinkling system is required at haul roads for all commodity handling sidings and at storage point of coal i.e., stockpile. Literature review[4] confirms that the traffic volume is more important than vehicle weight. Hence, fewer trips using larger vehicles will cause lower emissions of particulate matter than a greater number of trips with smaller trucks. Hence, transitioning fleets to larger capacity haul trucks may be a viable strategy to reduce emissions of particulate matter.

The dust is controlled mainly by the use of water trucks. The use of water trucks is considered to be one of the most inefficient ways to control dust. Effective dust control using water on haul roads requires uniform wetting and monitoring of weather conditions, like air, temperature, relative humidity, and wind direction and speed. Installing a sprinkler system with weather monitoring, centralized control, and proper water distribution components can be an effective and operationally efficient solution for control dust.

The amount of water required to sufficiently control the emissions, is dependent on the characteristics of materials (e.g., surface moisture content), ambient conditions (e.g., rainfall, humidity, temperature), activities occurring in the area (e.g., vehicle traffic, vehicle weight, speeds), and other factors.

Watering of haul roads is a standard practice as it is an effective method to control the particulate matter. However, where water supply is limited or costly, watering may not be adequate or desirable solution. In addition, watering of roads can result in a slippery surface and in some cases the addition of water can lead to the production of increased fine particles. Water tankers are the most common technique used for the application of water to haul roads in India. Watering can be applied using a variety of methods and is not limited to a traditional water tanker. The type of spraying system technology selected depends on the source of particulate matter and local conditions. There is a range of spray types and nozzles to optimise the beneficial effects of watering.

Wheel generated particulate matter associated with trucks travelling on unpaved haul roads is a major source of particulate matter emissions and so haul roads

[4] US Environmental Protection Agency (US EPA), 2006, AP 42, Fifth Edition

require an attention for their design, maintenance and management to minimise the emissions.

Best practice haul road design should include

- Minimisation of the distance by taking the direct route to the destination
- Optimise surface drainage, at intersections
- Restrict vehicle speeds on all roads to 40 km/hr or less
- Use larger trucks to minimise number of trips

Best practice haul road maintenance should include:

- Adequate grading (camber)
- Scheduled Carpeting
- Watering or application of chemical suppressants
- Regular maintenance of drainage system

Best practice haul road management should include:

- Regular monitoring to identify problem areas
- Regular watering of haul roads and as per the direction of haul truck operators Do not allow haul roads to become saturated as this will increase emissions once it dries out

Sprinkling System for Stockpiles: Water is used to keep the piles damp for dust suppression purposes; however it is not necessary to soak the piles to control the dust. Stockpiles are normally dried out for a few centimetres below the surface and are close to its original moisture levels. The large amounts of water are not needed to control dust. The objective is to maintain the surface moisture at a level so that dust does not become a problem. Water can be sprayed on the entire pile to control dust arising due to wind. Many stockpiles have large agricultural sprays to wet the entire pile. Generally there are the following ways to apply water to control the dust especially for coal.

- The sprinkler system should be equipped with nozzles of various sizes and an adjustable jet-breaker so that it provides a light and uniform rainfall across the area. The size and features of sprinkling system should be designed in such a way that the highest efficiency even at lowest operating pressures be obtained. The stockpile water sprinkling system is shown in **Figure 4.24**.

- There is also a new, proven and cost effective technique to control dust which is fogging system to remove dust from the air. The name fog is just what it implies, small droplets of water injected into the air. Fogging works by releasing very small droplets of water into the air. Airborne dust particles adhere to the water droplet and agglomerate. Once several have agglomerated together they become heavy enough to fall out of the air. The water droplet size is very important. If the droplet is too large, say 50 microns

plus, the dust particle will bounce off the water droplet surface tension and remain airborne. To achieve a useful dust suppression effect, the droplets need to have a mean diameter in the range of 10 to 15 microns, i.e. a similar size and mass to the respirable dust particles. The fogging system is shown in **Figure 4.25**.

FIGURE 4.24
STOCKPILE WATER SPRINKLER SYSTEM

FIGURE 4.25
FOGGING SPRINKLING

There are limitations of traditional water spraying method to control the dust, these are:

- Water – Spray will attract only heavier particles leaving fine particles to continue to blow away.
- Water evaporates quickly & therefore hot dry climates prevent it from having very little ability to suppress dust.
- When using huge amount of water to control full dust, mud formation is a regular phenomena.
- Floating Dust is not controlled / suppressed

By the addition of chemical suppressant, the efficiency of the dust particle capturing is increased. This has been described in the following paragraph.

Chemical suppressants: Dust suppressants are used to prevent particles from becoming airborne. In a chemical based dust suppression system, a chemical is used to reduce the surface tension of water, thereby increasing the dust adhesive power. The chemical helps in keeping the dust particles agglomerated for a longer period of time, thereby reducing the water requirement. Chemical suppressants can either compact the surface or form a new surface. The type of suppressant will depend on the road material that needs to be controlled and the rate and characteristics of the traffic. Chemical products used for dust suppression fall into eight main categories, listed in **Table 4.2.** They include water, products manufactured specifically as dust suppressants, natural or synthetic compounds, and waste or by-products from other uses and from manufacturing processes.

TABLE 4.2

TYPES OF SUPPRESSANT

	Suppressant Type	Products
1	Water	Fresh and Sea Water
2	Salts & brines	Calcium Chloride, Magnesium Chloride
3	Petroleum based Organics	Asphalt emulsion, cutback solvent, dust oil
4	Non Petroleum based Organics	Vegetable molasses, animal fats, ligninsulfonate,
5	Synthetic polymers	Polyvinyl acetate, vinyl acrylic
6	Electrochemical products	Enzymes, ionic products (e.g. ammonium chloride), Sulfonated oil,
7	Clay Additives	Bentonite, montmorillonite
8	Mulch & fiber mixtures	Paper mulch with gypsum binder, wood fiber mulch with brome seeds

Dust suppressants are applied either topically or mixed into the top layer of the soil. Topical application is with a spray bar on the back of a truck or through a large hose with a nozzle on the end.

Impacts will depend upon their composition, application rates, and interactions with other environmental components. Potential environmental impacts include: surface and groundwater quality deterioration; soil contamination; toxicity to soil and water biota; toxicity to humans during and after application; air pollution; accumulation in soils; changes in hydrologic characteristics of the soils; and impacts on native flora and fauna populations. Dust suppressants can potentially affect the environment beyond the application site. Overspray during application affects land, plants and fauna adjacent to the site. In addition, dust suppressants can be transported onto adjacent lands by heavy surface flow or air. Potential environmental impacts are highest from organic petroleum products which contain known toxic and carcinogenic compounds.

The Chemical suppressants use should be free from penetration of water in the road bed, fire hazard, evaluation of poisonous gas at high atmospheric temperatures, degradation of chemical structure over time, presence of toxic metals, and effect on human health, plants, and aquatic life. These need to be studied prior to application. The control efficiencies of suppressants should be depended on:

- Dilution rate of the mixture
- Application rate
- Time between applications
- Size, speed and volume of traffic
- Meteorological conditions
- Characteristics of the road

Application of all types of chemical dust suppressants should not be ruled out or permitted under all conditions. Application of chemical dust suppressants should be avoided near sensitive environments, near water bodies and fractured rock, in areas with a shallow groundwater table, and other areas where water could quickly reach the saturated zone. Site-specific characteristics should be considered when approving the use of dust suppressants.

Food products (e.g. soy oil, molasses) could be used, when possible, for they are likely to contain less toxic compounds than the industrial materials and waste products currently used as dust suppressants. Natural products are likely to biodegrade in the environment and therefore toxic effects are expected to be minimal. Some of the dust suppressant if used efficiently can be benefited as follows:

- Reduction of Water Consumption up to 40%.
- Creates DUST FREE ENVIRONMENT thereby prevents dust inhalation by the workers.
- No complains for pollution from around the villages, towns, states & / or other concerned authority.
- There should not be any adverse effect on Earth worm, Aquatic Life and Plants

4.2.2 Noise Pollution Control

Noise dispersion is based upon the distance it travels. The major noise generating machineries/equipments are within definite boundary of siding area. Hence, noise has insignificant impact on the surrounding area. The major noise activities at siding are loading and unloading of wagons, loader vehicle and trucks movement. However, due to some sidings which come within city limits have some possibility of noise disturbance which can be limited by following practices:

- Proper and timely maintenance of loading & unloading machineries,
- Provision of Green Belt for noise control,

- The operators and workers working in the high-noise areas shall be provided with ear-muffs/ear-plugs,
- The operator's cabins (control rooms) shall be properly (acoustically) insulated with special doors and observation windows,
- Acoustic laggings and silencers shall be provided in equipment wherever necessary,
- The silencers and mufflers of the individual machines shall be regularly checked,
- If generators will be used it should ensure that these machine /equipment meet the desired noise/vibration standards by providing noise absorbing material in enclosures,
- Provision of wind dust wall also acts as noise barrier to some extent,
- Restricting speed and preventing idling of transport vehicles,
- Use of high pressure horns operating within the siding and surrounding area shall be avoided

The permissible limit for noise is given in the National Ambient Noise Quality Standards, CPCB. All the sidings should comply with this standard. The National Ambient Noise Quality Standard is given in the **Annexure 4.2**.

4.2.3 Waste Water Environment

As observed during field visit at most of the sidings/Goodsheds do not have proper waste water collection and disposal systems. The waste water is now being collected or drained off by unchannelled way and in some places it is accumulated within siding area, in simple tank or to connection with nearby drains. The waste water should be re-used for plantation, road washing or sprinkling after providing proper treatment. To conserve the water, following practices should be adopted:

- The stacking area should be concreted/stone pitched with proper gradient to channelize the runoff into storm water drain and to prevent ground water contamination,
- Efficient waste water collection and disposal system
- Proper maintenance of open drainage system to avoid the choking,
- Provision of proper storm water management at the siding to ensure that pollutants and sediment are not carried into the nearby water bodies,
- The storm water drainage network must be kept separate from the sewage effluent system,
- Drainage must be controlled to ensure that runoff from the site will not culminate in offsite pollution, cause water damage to properties further down from the site or silting of any water resource.
- During monsoon season, the problem of coal yard drainage becomes critical due to coal particles and dust in the yard. To take care of this problem, the entire coal storage yard shall be provided with separate drains, which will lead to a separate sump of adequate capacity,

- In cases where facilities are linked to existing sewerage system, all necessary regulatory requirements should be adhered to,
- In case waste water contains any harmful substance which is harmful to the environment, the same shall be treated to remove so as to meet the prescribed norms,
- Adopt rainwater harvesting scheme to recharge ground water,

4.2.4 Solid Waste & Hazardous Waste Management

Solid Waste Management:

- All the solid wastes should be collected, segregated, transported and disposed at an authorized waste disposal facility,
- Temporarily storage facility should be designed in such a way that waste stored are not exposed to open atmosphere and are aesthetically acceptable,
- Storage bins should be painted green for biodegradable, blue for recyclable and red for non-biodegradable,
- Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the siding,
- Waste bins should be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance.
- Under no circumstances, waste is to be burnt or buried on siding area.

Hazardous Material Storage & Waste Management:

- The storage area must be secured with restricted entry and all hazardous substances such as fuel, oils, chemicals, etc., must be stored therein. Drip trays, a thin concrete slab or a facility with PVC lining, must be installed in such storage areas with a view to prevent soil and water pollution,
- Soil contaminated by fuel leakage shall be removed and disposed of in an approved manner,
- Petrochemicals, oils and identified hazardous substances shall only be stored under controlled conditions,
- Material Safety Data Sheets (MSDS) for onsite chemicals, hydrocarbon materials and / or waste and hazardous substances must be readily available. MSDS should include information pertaining to environmental impacts and measures to minimize and mitigate against any potential environmental impacts which may result from a spill,
- The management should prepare a method statement and plans for the storage of hazardous substances and emergency procedure,
- Storage of hazardous substances must not be within 100m of any drainage lines;
- Provide proper warning signage to make people aware of the activities within the designated areas,

- Spills should be cleaned up immediately to the satisfaction by removing the spillage together with the polluted soil and by disposing of it at a specified site,
- Training to staff on the safe disposal of hazardous waste
- Hazardous waste is to be disposed at a Permitted Hazardous Waste Landfill Site.

4.2.5 Soil Erosion

Soil erosion at siding site must be prevented by adopting proper measures at all times. Visual monitoring should be carried out through manual inspection and photographic records. Visual monitoring should be carried out by staff with good observational skills and the ability to collect the reliable data for record and report. It should identify the areas where immediate action is required. The soil erosion should be controlled by the following actions:

- Suitable erosion control measures must be implemented in areas sensitive to erosion such as open areas and edges of slopes,
- The exposed soil areas should be vegetated to ensure that soil is protected from the erosion,
- The removal of vegetation, only if it is necessary,
- Preventing the unnecessary removal of vegetation especially on steep slopes,
- The suitable use of sand bags or jute sheets.

4.2.6 Green Belt Development

The greenbelt development plan aims at overall improvement in the environmental conditions of the region. The green belt helps to capture the fugitive emissions and attenuate the noise generated at site along with improving the aesthetics of the area. Green vegetation cover is beneficial in many ways, such as retention of soil moisture, prevention of soil erosion, recharge of ground water and moderation of microclimate. Another important role of green belt relates to containment of air pollution.

Keeping in view the climatic conditions and quality of soil, the types of species shall be selected for plantation around the siding along the road and at various locations within siding. In addition to above some flowering plants, shrubs, herbs, and climber species shall also be planted for beautification of the siding area. Selected species should have faster growth, and helpful in soil and water conservation. At existing sidings, a green belt of at least 15 meter width needs to be developed. Also, plantation of trees all along the connecting and approach roads restricts dust pollution due to movement of vehicles.

Greenbelt Development Plan: In order to capture the pollutants, a greenbelt along the periphery of siding area should be developed. General list of plants suggested for green belt development is presented in **Table 4.3** and plant species for noise

prone area is presented in **Table 4.4**. The general plan for development of greenbelt is summarized below:

- Native species having characteristics of attenuation of pollution & Fast growing tress shall be planted,
- Trees growing up to height of 10 m or more should be planted around the siding area,
- Row planting pattern of trees should be undertaken around the installation to prevent horizontal dispersion of pollutants,
- Trees should also be planted along roadsides, to arrest auto exhaust and noise pollution,
- Turfing of grass (lawn) for effective trapping and absorption of air pollutants,
- The species identified for greenbelt development shall be planted using pitting technique.

TABLE 4.3
PLANTS SUGGESTED FOR GREEN BELT DEVELOPMENT

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Syzygium cumini*	Jamun
3	*Acacie nilotica*	Babul
4	*Dalbergia sisso*	Shisham
5	*Emblica officinalis*	Amla
6	*Pongamia pinnata*	Karanj
7	*Tectona grandis*	Sagwan
8	*Acacia arbacia*	Babool

TABLE 4.4
PLANT SPECIES FOR NOISE PRONE AREAS

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Aegle marmelos*	Bel
3	*Saraca indica*	Sita-Ashoka
4	*Dalbergia latifolia*	Shisham
5	*Albizzia lebbeck*	Siris
6	*Tectona grandis*	Teak
7	*Polyathiaa*	Ashoka
8	*Ficus religiose*	Peepal
9	*Magnifera indica*	Mango

4.2.7 Up-gradation of Existing Facilities

The potential pollution needs to be mitigated or curtailed at the point of source. This includes changes in system and personnel involved in handling the works. The material handling facilities should be replaced. If required these aging infrastructures may not be able to pursue in reducing dust generation. New facilities should be

aiming to include current best practice in dust minimization. The faulty and un-operational arrangements at siding need to be replaced. Those arrangements which are not replaceable should be replaced with new improved techniques available and suitable.

4.2.8 Land Use

Integrated transportation and land use planning is an essential requirement to achieve a truly efficient freight system. With continued urban expansion it is essential that Sidings should be identified to be relocated outside of urban centres due to anticipated future growth and pollution hazards.

4.2.9 Public Complaints

Despite widespread pollution intensive activities and receipt of numerous complaints, siding owners need to frame comprehensive guidelines relating to handling and transportation of pollution intensive commodities. To address the community complaints on pollution due to siding operation are the responsibility of siding owners. Appropriate response to the community complaints is likely to reduce the number of both ongoing and new pollution related community issues. Siding owners should prepare specific guidelines for handling of community complaints and this should include:

- Clear and regular communication with community groups, councils, forums and individuals to discuss the issues,
- Recording and attending the complaints, coordinating the response and providing a solution,
- Information on pollution mitigation initiatives being undertaken,
- Improved relations with local communities, councils and forums that raise the social responsibility profile and provide opportunity to better focus solutions to root cause of community perception and concerns.

4.2.10 Environmental Monitoring

Environmental monitoring should be the major component of the environmental policy formulated for sidings.

- Environmental monitoring will be undertaken by the concern siding owner on periodic basis,
- This monitoring will be undertaken in order to ensure compliance with all aspects or requirements of the Environmental Measures.
- Undertake external audits.
- Visual monitoring must be carried out periodically to ensure that the concerned activities create no impacts in and around the siding area.

4.2.11 Implementation of Environmental Management

The protection of environment will be the responsibility of siding owners. Siding owner shall develop an environmental management unit. The task of the unit would be to supervise and co-ordinate implementation of environmental mitigation measures.

4.2.12 Education and Awareness Programs

Siding Owners must initiate the internal as well as external awareness programs involving all the stakeholders in controlling and enhancing the environment. This will include meetings, environmental forums on and off site to analyse dust generation events. Internal/External education and awareness for the management of pollution from siding activities shall help to improve operational proficiency in the handling of materials. Improved loading competency leads to reduce pollution.

Develop environmental awareness among operational and maintenance personnel associated with siding activities. Development of operator procedural training to implement revised and new unloading practices should be ensured to maintain the consistent work practices among all work personnel's involved in loading & unloading activities. An Environmental Awareness programme shall be implemented for all siding personnel to acquaint about the key environmental issues and potential impacts thereof. It will be ensured that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations within the siding area.

Environmental Awareness Plan should be such that, the goals setup by the management for pollution abetment be met. Management is responsible to formulate the procedure to carry out the pollution abatement program. Responsibility of management should be in strict compliance with the comprehensive training and programs. General environmental training is to ensure that employees and contractors [5] at each relevant function and level should receive environmental training and be aware of the environmental management initiatives undertaken during operations. Progress on compliance with the training program must be verified during the Management meetings. The various parameters for the training programs should include:

- Dust pollution Management
- Water management
- Waste management
- Spill management
- Complaint Management
- Incident reporting

[5] Contractor: Transportation Lorry owners, Tanker owners etc

CHAPTER – 5
CEMENT SIDINGS

5.1 EXISTING OPERATION SYSTEM

There were seven cement siding those were visited during the study. Out of seven, six cement sidings were found to be operated manually. The list of coal siding visited is given in the **Table 5.1**. The manual process of cement handling and sources of pollution are described in the sections ahead.

5.1.1 Operating System

The cement handling at railway siding was found to be carried out by the manual system. The cement bags were found stored at closed godowns at six locations and at one location the storage facility was in tin shed. The cement bag (50 kg) is unloaded through trucks at platform or directly loaded to wagons. No mechanical loading of cement was observed at any siding during field visits.

5.1.1.1 Pollution due to Operating System

The dust particles generated during handling are released and spread in the atmosphere. The influence area of pollution depends upon the wind velocity & direction and the quantity of cement handled. If cement is unloaded and loaded directly from the trucks to wagons, it generates less pollution but it was observed that dual activity of loading & unloading are carried at siding. It was first stacked at godowns and then loaded to wagons. It was noticed that, the siding located at Shalimar, South Eastern Zone is closer to Shalimar passenger station, where the situation is worsened due to its location near passenger platform. The passengers complain about the exposure of cement dust particles. It was also heard during the site visit that due to exposure of cement dust, the siding is likely to be shifted. The godowns at the sidings are open and the workers were found with no protective equipments.

TABLE 5.1 CEMENT SIDINGS

SI	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
1	M/s Madras Cement Ltd, Jaggayapet Town	SCR	Gypsum, Coal, Cement, Clinker	Mechanical	5000 lit/day	Yes	No	No	PM	SS	• Water Sprinkler
2	Associated Cement Co. Secundarabad	SCR	Coal, Cement	Conveyer Belt, Manual	1000 lit/day	Yes	No	No	PM	SS	• Scattered plantation
3	ACC siding, Dhanbad	ECR	Cement & Clinker	Manual	1000 lit/day	Yes	Yes	No	PM	SS	• Green Belt
4	Dhanmandal	ECOR	Sponge iron, Cement, Fertilizer, Salt	Manual		Yes	No	No	PM	SS	
5	Shalimar (Terminal yard)	SE	Iron, Cement	Crane, Manual	Not Available	Yes	Yes	No	PM	SS	
6	New Guwahati	NFR	Cement, Coal, POL	Manual & Mechanical (POL)	5000 lit/day	Yes	--	Yes	PM	--	• No system for POL waste • Natural trees
7	Shree Cement Pvt. Rly Siding	NWR	Cement Clinker,Cement bags,Coal, Gypsum	Mechanical	500 lit/day	Yes	Yes	No	PM	--	• Plantation

5.1.1.2 Pollution due to Haul Road

The pollution scenario due to haul road at cement siding is similar to the coal siding. The cement particles from cement bags and residual cement particles in dumpers/trucks and on the road are the major sources of pollution. The intensity of this type of pollution is severe as compared to loading and unloading operation. It was noticed during visit that, the layer of cement particles were lying on the approach road. At some locations, the roads are paved but not maintained.

5.1.2 Treatment System

5.1.2.1 Cement particle collection

No system exists at any railway siding to collect the cement particles from road and from locations of loading and unloading activity.

5.1.2.2 Waste Water Collection System

No proper waste collection system was observed during visit. Also the drainage system to drain out the rain water was not found at any siding. It was observed at some sidings that, the cement bags got hardened due to contact with water. This happened due to improper storing facilities.

5.1.2.3 Solid Waste Disposal System

No proper solid waste collection and disposal facility was found. The cement particles which left over on the siding area are drained out during rainy days. This chokes the community drainage system.

5.1.2.4 Vegetation

No vegetation cover was observed at any siding to control the dust except at ACC siding, Dhanbad. The scattered plantation was observed at ACC siding, Secundarabad.

5.2 ENVIRONMENTAL MANAGEMENT PLAN FOR CEMENT SIDINGS

An attempt has been made to prepare the management plan on the basis of observations, available data and discussion made during field studies. Some impacts which were not identified during field visit due to unseen and unreported activities were also included for completeness of Environmental Management.

5.2.1 Air Pollution Control

The sources of pollution are mostly from loading and unloading and haul roads. The dust control plan for various activities at siding is as follows:

5.2.1.1 Loading & Unloading: The intensity of dust pollution largely depends on the loading and unloading process at siding which has significant impact on environment. The adoption of following practice will provide significant control on dust pollution:

- Mechanised wagon loading system
- Loading and unloading should be directly from trucks to wagons and wagons to trucks
- All storages & material handling systems should be under closed shed

5.2.1.2 Haul Roads: It was observed that during transportation of materials by road which causes spillages of material resulting dust formation.The most of the reviewed literatures and reports reveals that the major source of dust generation is due to wheel contact with road during vehicular movement. The management plan for minimizing haul road dust generation is as follows:

- An unpaved roads should be paved at the existing sidings,
- Higher grading of main haul roads and service roads to clear accumulated loose material,
- Regular sprinkling of water on haul roads for dust suppression,
- Dust dislodgement from vehicular movement must be minimized by implementing speed limits,
- The trucks carrying cement should be covered with the Tarpaulin.
- Truck body washing system before entering and outing from siding area
- Vehicular movement at the siding area, shall be regulated effectively to avoid traffic congestion and to protect the workers from dust due to exposure in dusty environment,
- Emissions from the heavy duty vehicles operating in and out of siding shall follow the standard under Motor Vehicles Rules.
- Afforestation with dust filtering trees around siding area for control of dust.

Dust emission from the various activities at siding is in the form of Particulate Matter PM_{10} and $PM_{2.5}$. The permissible limit for these parameters is given in the National Ambient Air Quality Standards, CPCB. All the air pollution parameters at sidings should comply with this standard. The National Ambient Air Quality Standard is given in the Annexure 4.1.

5.2.2 Noise Pollution Control

Noise dispersion is based upon the distance it travels. The major noise generating machineries/equipments are within definite boundary of siding area. Hence, noise has insignificant impact on the surrounding area. The major noise activities at siding are loading and unloading of wagons, loader vehicle and trucks movement. However, some sidings which come within city limits have some possibility of noise disturbance. This can be protected through the following practices:

- Proper and timely maintenance of loading & unloading machineries,
- Provision of Green Belt for noise control,
- The operators and workers working in the high-noise areas shall be provided with ear-muffs/ear-plugs,
- The operator's cabins (control rooms) shall be properly (acoustically) insulated with special doors and observation windows,
- Acoustic laggings and silencers shall be provided in equipment wherever necessary,
- The silencers and mufflers of the individual machines shall be regularly checked,
- If generators will be used it should ensure that these machine /equipment meet the desired noise/vibration standards by providing noise absorbing material in enclosures,
- Provision of wind dust wall which also acts as noise barrier to some extent,
- Restricting speed and preventing idling of transport vehicles,
- Use of high pressure horns operating within the siding and surrounding area shall be avoided

The permissible limits for noise are given in the National Ambient Noise Quality Standards, CPCB. All the sidings/Goodsheds should comply with this standard. The National Ambient Noise Quality Standard is given in the Annexure 4.2.

5.2.3 Waste Water Environment

The most of the sidings do not have proper waste water collection and disposal systems. The waste water is now being collected or drained off by unchannelled way and in some places it is accumulated within siding area, in simple tank or to connection with nearby drains. The waste water should be re-used for plantation, road washing or sprinkling after providing proper treatment. To conserve the water, following practices should be adopted:

- The operating area should be concreted/stone pitched with proper gradient to channelize the runoff into storm water drain and to prevent ground water contamination,
- Provision of proper storm water management at the siding to ensure that pollutants and sediment are not carried into the nearby water bodies,

- The storm water drainage network must be kept separate from the sewage effluent system,
- Efficient use of water spraying on haul roads i.e. before and after maximum frequency of traffic,
- Proper maintenance of open drainage system to avoid the choking,
- Domestic effluent shall be properly treated,
- Drainage must be controlled to ensure that runoff from the site will not culminate in offsite pollution, cause water damage to properties further down from the site or silting of any water resource.
- In cases where facilities are linked to existing sewerage system, all necessary regulatory requirements should be adhered to,
- In case waste water contains any harmful substance which is harmful to the environment, the same shall be treated to remove so as to meet the prescribed norms,
- Adoption rainwater harvesting scheme to recharge ground water,

5.2.4 Solid Waste & Hazardous Waste management

Solid Waste Management:

- The cement left at ground during loading and unloading should have proper collection, repackaging facility,
- All the municipal solid wastes should be collected, segregated, transported and disposed at an authorized waste disposal facility,
- Temporarily storage facility should be designed in such a way that waste stored are not exposed to open atmosphere and are aesthetically acceptable,
- Storage bins should be painted green for biodegradable, blue for recyclable and red for non-biodegradable,
- Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the siding,
- Waste bins should be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance.
- Public awareness programme needs to be conducted for proper segregation of MSW at the source by way of conducting seminars/workshops.
- Under no circumstances, waste is to be burnt or buried on siding area.

Hazardous Material Storage & Waste Management:

- The storage area must be secured with restricted entry and all hazardous substances such as fuel, oils, chemicals, etc., must be stored therein. Drip trays, a thin concrete slab or a facility with PVC lining, must be installed in such storage areas with a view to prevent soil and water pollution,
- Soil contaminated by fuel leakage shall be removed and disposed of in an approved manner,

- Petrochemicals, oils and identified hazardous substances shall only be stored under controlled conditions,
- Material Safety Data Sheets (MSDS) for onsite chemicals, hydrocarbon materials and / or waste and hazardous substances must be readily available. MSDS should include information pertaining to environmental impacts and measures to minimize and mitigate against any potential environmental impacts which may result from a spill,
- The management should prepare a method statement and plans for the storage of hazardous substances and emergency procedure,
- Storage of hazardous substances must not be within 100m of any drainage lines;
- Provide proper warning signage to make people aware of the activities within the designated areas,
- Spills should be cleaned up immediately to the satisfaction by removing the spillage together with the polluted soil and by disposing of it at a specified site,
- Training to staff on the safe disposal of hazardous waste
- Hazardous waste is to be disposed at a Permitted Hazardous Waste facility.

5.2.5 Soil Erosion

Soil erosion at siding site must be prevented by adopting proper measures at all times. Visual monitoring should be carried out through manual inspection and photographic records. Visual monitoring should be carried out by staff with good observational skills and the ability to collect the reliable data for record and report. It should identify the areas where immediate action is required. The soil erosion should be controlled by the following actions:

- Suitable erosion control measures must be implemented in areas sensitive to erosion such as open areas and edges of slopes,
- The exposed soil areas should be vegetated to ensure that soil is protected from the erosion,
- The removal of vegetation, only if it is necessary,
- Preventing the unnecessary removal of vegetation especially on steep slopes,
- The suitable use of sand bags or jute sheets.

5.2.6 Green Belt Development

The greenbelt development plan aims at overall improvement in the environmental conditions of the region. The green belt helps to capture the fugitive emissions and attenuate the noise generated at site along with improving the aesthetics of the area. Green vegetation cover is beneficial in many ways, such as retention of soil moisture, prevention of soil erosion, recharge of ground water and moderation of microclimate.

Keeping in view the climatic conditions and quality of soil, the types of species shall be selected for plantation around the siding and along the roads. In addition to above some flowering plants, shrubs, herbs, and climber species shall also be planted for beautification of the siding area. Selected species should have faster growth, and helpful in soil and water conservation. A green belt of at least 15 meter width needs to be developed within siding peripheral area.

Greenbelt Development Plan: In order to capture the pollutants, a greenbelt along the periphery of siding area should be developed. General list of plants suggested for green belt development is presented in **Table 5.2** and plant species for noise prone area is presented in **Table 5.3**. The general plan for development of greenbelt is summarized below:

- Native species having characteristics of attenuation of pollution & Fast growing tress shall be planted,
- Trees growing up to height of 10 m or more should be planted
- Row planting pattern of trees should be undertaken around the installation to prevent horizontal dispersion of pollutants,
- Trees should also be planted along roadsides, to arrest auto exhaust and noise pollution,
- Turfing of grass (lawn) for effective trapping and absorption of air pollutants,

TABLE 5.2
PLANTS SUGGESTED FOR GREEN BELT DEVELOPMENT

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Syzygium cumini*	Jamun
3	*Acacie nilotica*	Babul
4	*Dalbergia sisso*	Shisham
5	*Emblica officinalis*	Amla
6	*Pongamia pinnata*	Karanj
7	*Tectona grandis*	Sagwan
8	*Acacia arbacia*	Babool

TABLE 5.3
PLANT SPECIES FOR NOISE PRONE AREAS

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Aegle marmelos*	Bel
3	*Saraca indica*	Sita-Ashoka
4	*Dalbergia latifolia*	Shisham
5	*Albizzia lebbeck*	Siris
6	*Tectona grandis*	Teak
7	*Polyathiaa*	Ashoka
8	*Ficus religiose*	Peepal
9	*Magnifera indica*	Mango

5.2.7 Up-gradation of Existing Facilities

The potential pollution needs to be mitigated or curtailed at the point of source. This includes changes in system and personnel involved in handling the works. The material handling facilities consists of old infrastructure should be replaced. These aging infrastructures may not be able to pursue in reducing dust generation. New facilities should be aiming to include current best practice in dust minimization. New improved techniques should be adopted.

5.2.8 Land Use

Integrated transportation and land use planning is an essential requirement to achieve a truly efficient freight system. With continued urban expansion it is essential that Sidings and Good-sheds should be identified to be relocated outside of urban centres due to anticipated future growth and pollution hazards.

5.2.9 Public Complaints

Despite widespread pollution intensive activities and receipt of numerous complaints, siding owners need to frame comprehensive guidelines relating to handling and transportation of pollution intensive commodities. To address the community complaints on pollution due to freight traffic and siding operation are the responsibility of siding owners. Appropriate response to the community complaints is likely to reduce the number of both ongoing and new pollution related community issues. Siding owners should prepare specific guidelines for handling of community complaints and this should include:

- Clear and regular communication with community groups, councils, forums and individuals to discuss the issues,
- Recording and attending the complaints, coordinating the response and providing a solution,
- Information on pollution mitigation initiatives being undertaken,
- Improved relations with local communities, councils and forums that raise the social responsibility profile and provide opportunity to better focus solutions to root cause of community perception and concerns.

5.2.10 Environmental Monitoring

Environmental monitoring should be the major component of the environmental policy formulated for sidings.

- Environmental monitoring will be undertaken by the concern siding owner on periodic basis,
- This monitoring will be undertaken in order to ensure compliance with all aspects or requirements of the Environmental Measures.
- Undertake external audits.

- Visual monitoring must be carried out periodically to ensure that the concerned activities create no impacts in and around the siding area.

5.2.11 Implementation of Environmental Management

The protection of environment will be the responsibility of siding owners. Siding owner shall develop an environmental management unit. The task of the unit would be to supervise and co-ordinate implementation of environmental mitigation measures.

5.2.12 Education and Awareness Programs

Siding Owners must initiate the internal as well as external awareness programs involving all the stakeholders in controlling and enhancing the environment. This will include meetings, environmental forums on and off site to analyse dust generation events. Internal/External education and awareness for the management of pollution from siding activities shall help to improve operational proficiency in the handling of materials. Improved loading competency leads to reduce pollution.

Develop environmental awareness among operational and maintenance personnel associated with siding activities. Development of operator procedural training to implement revised and new unloading practices should be ensured to maintain the consistent work practices among all work personnel's involved in loading & unloading activities. An Environmental Awareness programme shall be implemented for all siding personnel to acquaint about the key environmental issues and potential impacts thereof. It will be ensured that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations within the siding area.

Environmental Awareness Plan should be such that, the goals setup by the management for pollution abetment be met. Management is responsible to formulate the procedure to carry out the pollution abatement program. Responsibility of management should be in strict compliance with the comprehensive training and programs. General environmental training is to ensure that employees and contractors [6] at each relevant function and level should receive environmental training and be aware of the environmental management initiatives undertaken during operations. Progress on compliance with the training program must be verified during the Management meetings. The various parameters for the training programs should include:

- Dust pollution Management
- Water management
- Waste management
- Spill management

[6] Contractor: Transportation Lorry owners, Tanker owners etc

- Complaint Management
- Incident reporting

CHAPTER – 6
FOODGRAINS & FERTILIZER SIDINGS

6.1 EXISTING OPERATION SYSTEM OF FOOD GRAIN SIDING

6.1.1 Operating System

The five railway sidings related to food grains were visited and these all were found with manual operated. The list of Food grain siding visited is given in the **Table 6.1**. The food grains are transported through packed bags. Before loading to the wagons, the bags are temporarily stored at designated storage place.

The designated storage place should have been closed or open. It was observed during visits, the bags of food grains were stored at the siding Platform/Ground. The activity is carried out through head loads or change of head loads. Out of five siding, food grain at three siding is stored at closed godowns and at two locations the storage facility is tin shed. The storing of food grains at siding is shown in the **Figure 6.1**.

FIGURE 6.1
STORAGE OF FOOD GRAINS

6.1.1.1 Pollution due to operating system

The food grain handling at five siding are operated through manual system. The point of source of pollution is leakage of grains. No air pollution was noticed during operation at food grain siding.

TABLE 6.1: FOODGRAIN SIDINGS VISITED

Sl	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
1	FCI Grain Godown siding, Tirchy	SR	Food Grain	Manual	200 lit/day	No	Yes	No	PM	SS	• Left over collected by slum dwellers/villagers
2	Sri Nand Kumar & Sons, Bibinagar, Secundarabad	SCR	Coal,POL, Foodgrains	Mechanical Mechanical Manual	500 lit/day	Yes	No	No	PM	SS	Not Available
3	Sabarmati Goodshed, Ahmadabad	WR	Foodgrains,All Commodities except POL	Manual	Not Available	Yes	Yes	No	PM	SS	Not Available
4	FCI siding, New Guwahati	NFR	Foodgrains	Manual	1000 lit/day	No	No	No	--	--	• Channel for drain & rain water
5	Railway Siding (ITC, Adani, Deviprakash Stayadev Tolaram Co.)	WCR	DOC, Wheat	Manual	250 lit/day	No	No	No	No	--	

6.1.1.2 Pollution due to Haul Road

The dust pollution at food grain siding is due to unpaved road. The dust particles of unpaved roads are the major source of pollution. It was noticed during visit that, the haul roads are unpaved and not maintained. The haul road at one of the food grain operating siding is shown in **Figure 6.2**.

FIGURE 6.2
HAUL ROAD CONDITION AT FOOD GRAIN RAILWAY SIDING

6.1.2 Treatment System

6.1.2.1 Food grain particle collection

The loose grains on ground are collecting through sweeping. The system exists in which, food grains are collected by slum dwellers or people living nearby villages.

6.1.2.2 Waste Water Collection System

No proper waste water and drainage collection system was observed at all siding except at FCI siding, New Guwahati.

6.1.2.3 Solid Waste Disposal System

No proper domestic solid waste collection and disposal facility exists. The food grain which left over at siding area is collected as mentioned above.

6.1.2.4 Vegetation

No vegetation cover was observed at any siding except at FCI Grain Godown siding, Tirchy.

6.2 EXISTING OPRATING SYSTEM OF FERTILIZER SIDING

6.2.1 Operating System

The four siding of fertilizer were visited in which all were operated manually. The list of Fertilizer siding visited is given in the **Table 6.2**. The fertilizer was transported through packed bags. It was the practice that before loading the wagons, the bags of fertilizer were temporarily stored at designated storage place. The bags of fertilizer were stored at the Siding Platform/Ground. The storage place should have been closed or open. The activity was carried out through head loads or change of head loads.

Out of four locations, the fertilizer was stored at closed godowns at two locations and at other locations the storage facility was open i.e. tin shed. It was also observed that at Shrirampur siding, Kalkatta the fertilizer bags were directly loaded to wagons through trucks. The direct loading of fertilizer from trucks to wagons is shown in the **Figure 6.3**

FIGURE 6.3
TRUCKS TO WAGOAN LOADING OF FERTILIZER

6.2.1.1 Pollution due to operating system

The handling of fertilizer at four siding was operated through manual system. The points of source of pollution are leakages. No air pollution was noticed during operation at sidings. The pollution at these sidings is only by leakage during loading/ unloading. The leakage of fertilizer was collected on tarpaulin placed below the bags and further packed in the bags. The photograph of leakage of fertilizer is shown in **Figure 6.4**.

TABLE 6.2: FERTILIZER SIDINGS VISITAED

SI	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
1	Rangiyagarh siding, Paradip	ECOR	Fertilizer	Manual	Not available	No	Yes	No	PM	SS	• Green belt
2	Gujarat State Fertilizer Ltd, Vadodara	WR	Fertilizer, Ammonia	Manual	1000 lit/day	No	Yes	No	--	--	• Used in own Nursery as manure • Green belt
3	IFFCO Siding	WR	Fertilizer, Urea/Ammonia	Manual	200 lit/day	No	Yes	No	--	SS	• Scattered Plantation
4	Shrirampur, kalkatta	SW	Fertilizer, Vegetable oil	Manual	Not Available	No	No	No	--	SS	

FIGURE 6.4
FERTILIZER WASTE AT SIDING

6.2.1.2 Pollution due to Haul Road

It was noticed during visit that, the haul roads were unpaved and not maintained. The dust generated due to vehicular movements on the unpaved roads is the major source of pollution.

6.2.2 Treatment System

6.2.2.1 Fertilizer Leakage collection

The leakage fertilizer was being collected on tarpaulin placed at the siding platform. The leakage fertilizer is then collected from tarpaulin and packed again.

6.2.2.2 Waste Water Collection System

The waste water collection and storm water drainage system is not exists at any siding. The water logging area at Rangiyagarh siding is shown in **Figure 6.5**.

FIGURE 6.5
WATER LOGGING AREA AT SIDING

6.2.2.3 Solid Waste Disposal System

No proper domestic solid waste collection and disposal facility was noticed. The leakage fertilizer is being collected by sweeping.

6.2.2.4 Vegetation

The green belt is observed at Rangiyagarh siding, Paradip siding and at Gujarat State Fertilizer Ltd siding, Vadodara. Scattered vegetation is observed at IFFCO Siding. No vegetation cover is observed at Shrirampur siding, kalkatta. The vegetation at one of the siding is shown in **Figure 6.6**.

FIGURE 6.6
VEGETATION AT SIDING

6.3 ENVIRONMENTAL MANAGEMENT PLAN FOR FOODGRAINS & FERTILIZER SIDINGS

An attempt has been made to prepare the management plan on the basis of observations, available data and discussion made during field studies. Some impacts which were not identified during field visit due to unseen and unreported activities is also included for completeness of Environmental Management. The pollutional impacts of foodgrain and fertilizer siding is almost common and hence common Environmental Management is presented.

6.3.1 Air Pollution Control

The sources of pollution are mostly from haul roads. The dust control plan for various activities at siding is as follows:

6.3.1.1 Haul Roads

The major source of dust generation is due to wheel contact with road during vehicular movement. The management plan for minimizing haul road dust generation is as follows:

- An unpaved roads should be paved at the existing sidings,
- Higher grading of main haul roads and service roads to clear accumulated loose material,
- Regular sprinkling of water on haul roads for dust suppression,
- Dust dislodgement from vehicular movement must be minimized by implementing speed limits,
- The trucks carrying goods should be covered with the Tarpaulin.
- Truck body washing system before entering and outing from siding area
- Vehicular movement at the siding area, shall be regulated effectively to avoid traffic congestion and to protect the workers from dust due to exposure in dusty environment,
- Emissions from the heavy duty vehicles operating in and out of siding shall follow the standard under Motor Vehicles Rules.
- Afforestation with dust filtering trees around siding area for control of dust.

Dust emission from the various activities at siding is in the form of Particulate Matter PM_{10} and $PM_{2.5}$. The permissible limit for these parameters is given in the National Ambient Air Quality Standards, CPCB. All the air pollution parameters at sidings should comply with this standard. The National Ambient Air Quality Standard is given in the Annexure 4.1.

6.3.2 Noise Pollution Control

Noise dispersion is based upon the distance it travels. The major noise generating machineries/equipments are within definite boundary of railway siding area. Hence, noise has insignificant impact on the surrounding area. The major noise activities at siding are loading and unloading of wagons, loader vehicle and trucks movement. However, due to some sidings which comes within city limits have some possibility of noise disturbance which can be protected through the following practices:

- Proper and timely maintenance of loading & unloading machineries,
- Provision of Green Belt for noise control,
- The operators and workers working in the high-noise areas shall be provided with ear-muffs/ear-plugs,
- The operator’s cabins (control rooms) shall be properly (acoustically) insulated with special doors and observation windows,
- Acoustic laggings and silencers shall be provided in equipment wherever necessary,
- The silencers and mufflers of the individual machines shall be regularly checked,

- If generators will be used it should ensure that these machine /equipment meet the desired noise/vibration standards by providing noise absorbing material in enclosures,
- Provision of wind dust wall which also acts as noise barrier to some extent,
- Restricting speed and preventing idling of transport vehicles,
- Use of high pressure horns operating within the siding and surrounding area shall be avoided

The permissible limit for noise is given in the National Ambient Noise Quality Standards, CPCB. All the sidings should comply with this standard. The National Ambient Noise Quality Standard is given in the Annexure 4.2.

6.3.3 Waste Water Environment

The most of the sidings do not have proper waste water collection and disposal systems. The waste water is now being collected or drained off by unchannelled way and in some places it is accumulated within siding area, in simple tank or to connection with nearby drains. The waste water should be re-used for plantation, road washing or sprinkling after providing proper treatment. To conserve the water, following practices should be adopted:

- The operating area should be concreted/stone pitched with proper gradient to channelize the runoff into storm water drain and to prevent ground water contamination,
- Provision of proper storm water management at the siding to ensure that pollutants and sediment are not carried into the nearby water bodies,
- The storm water drainage network must be kept separate from the sewage effluent system,
- Efficient use of water spraying on haul roads i.e. before and after maximum frequency of traffic,
- Proper maintenance of open drainage system to avoid the choking,
- Domestic effluent shall be properly treated,
- Drainage must be controlled to ensure that runoff from the site will not culminate in offsite pollution, cause water damage to properties further down from the site or silting of any water resource.
- In cases where facilities are linked to existing sewerage system, all necessary regulatory requirements should be adhered to,
- In case waste water contains any harmful substance which is harmful to the environment, the same shall be treated to remove so as to meet the prescribed norms,
- Adoption rainwater harvesting scheme to recharge ground water,

6.3.4 Solid Waste & Hazardous Waste management

Solid Waste Management:

- The foodgrains/fertilizer leakage at ground during loading and unloading should have proper collection, repackaging facility,
- Loading and unloading should be directly from trucks to wagons and wagons to trucks
- All materials should be stored in closed shed
- All the solid wastes should be collected, segregated, transported and disposed at an authorized waste disposal facility,
- Temporarily storage facility should be designed in such a way that waste stored are not exposed to open atmosphere and are aesthetically acceptable,
- Storage bins should be painted green for biodegradable, blue for recyclable and red for non-biodegradable,
- Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the siding,
- Waste bins should be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance.
- Public awareness programme needs to be conducted for proper segregation of MSW at the source by way of conducting seminars/workshops.
- Under no circumstances, waste is to be burnt or buried on siding area.

Hazardous Material Storage & Waste Management:

- The storage area must be secured with restricted entry and all hazardous substances such as fuel, oils, chemicals, etc., must be stored therein. Drip trays, a thin concrete slab or a facility with PVC lining, must be installed in such storage areas with a view to prevent soil and water pollution,
- Soil contaminated by fuel leakage shall be removed and disposed of in an approved manner,
- Petrochemicals, oils and identified hazardous substances shall only be stored under controlled conditions,
- Material Safety Data Sheets (MSDS) for onsite chemicals, hydrocarbon materials and / or waste and hazardous substances must be readily available. MSDS should include information pertaining to environmental impacts and measures to minimize and mitigate against any potential environmental impacts which may result from a spill,
- The management should prepare a method statement and plans for the storage of hazardous substances and emergency procedure,
- Storage of hazardous substances must not be within 100m of any drainage lines;
- Provide proper warning signage to make people aware of the activities within the designated areas,

- Spills should be cleaned up immediately to the satisfaction by removing the spillage together with the polluted soil and by disposing of it at a specified site,
- Training to staff on the safe disposal of hazardous waste
- Hazardous waste is to be disposed at a Permitted Hazardous Waste facility.

6.3.5 Storage Facility

Godowns: At many places, the commodities like food-grains, fertilizers, agriculture products and other bagged materials are stored at open platform. The storage for such commodities should be stored at godowns to avoid the wastage through leakage and loading transit.

The bags should not be kept on the floor as it restricts the free movement of air and creates a fertile ground for the growth and development of insects and pests. Dunnage comprising either timber pallets, timber squares, mattings or a layer of polythene sheet sandwitched between two layers of mattings shall be laid on each stack space. As far as possible, locally available and cheaper materials should be used for dunnage. Also, the distance between loading/unloading point and godowns should be maintained minimum to avoid the transit loss. The godowns should be constructed or maintained to protect the material for transit loss and wastage. Some of the salient points are as described here.

- The structure shall be designed to make it possible to control moisture.
- The structure shall be so oriented that it shall receive the minimum solar radiation.
- Godowns shall be designed as per the storage capacity.
- The plinth shall be generally kept about 80 cm above the finished ground level.
- Circulating Platforms should be provided along the length of the godown in order to facilitate loading and unloading.
- The platform should be provided with an outward slope of 1 in 40 in order to prevent the rain water from getting inside the godowns through the doors. The platforms shall be preferably covered.

Proper arrangement such as cast iron or asbestos cement pipes shall be provided to drain off the rain water from the roofs of godown and platform. Their diameter shall also be adequate depending upon the intensity of rainfall of the place. Suitable drainage arrangements such as surface or underground drains to drain the rain water from the storage premises shall be made.

Silo-based grain storage: Silo Storage Systems is a proven scientific system for storage of food grains. This system ensures zero wastage due to moisture, fungus & rodents etc. Galvanised silos are used for storage of grains in bulk for longer period. The galvanised silos are equipped with accessories like level switches, aeration system, temperature monitoring, ventilation and sweep augers. These accessories help to monitor the quality of stored grain inside the silos. The galvanised silos with

accessories are installed with grain conveying equipments like bucket elevators, chain /belt conveyors and post-harvest equipments like pre-cleaners, fine cleaners, de-stoner and dryers etc. The grain received in the silo complex is handled by conveying equipments in bulk and stored in galvanised silos after cleaning. Moisture content in grain also plays an important role in storage life of grain. Mechanisation for handling of grain and storage in galvanised silos in bulk requires less manpower which reduces the cost of handling and storage. Distribution / transportation of grain in bulk play an important role in order to minimise the leakage through the bags.

6.3.6 Soil Erosion

Soil erosion at siding site must be prevented by adopting proper measures at all times. Visual monitoring should be carried out through manual inspection and photographic records. Visual monitoring should be carried out by staff with good observational skills and the ability to collect the reliable data for record and report. It should identify the areas where immediate action is required. The soil erosion should be controlled by the following actions:

- Suitable erosion control measures must be implemented in areas sensitive to erosion such as open areas and edges of slopes,
- The exposed soil areas should be vegetated to ensure that soil is protected from the erosion,
- The removal of vegetation, only if it is necessary,
- Preventing the unnecessary removal of vegetation especially on steep slopes,
- The suitable use of sand bags or jute sheets.

6.3.7 Green Belt Development

The greenbelt development plan aims at overall improvement in the environmental conditions of the region. The green belt helps to capture the fugitive emissions and attenuate the noise generated at site along with improving the aesthetics of the area. Green vegetation cover is beneficial in many ways, such as retention of soil moisture, prevention of soil erosion, recharge of ground water and moderation of microclimate.

Keeping in view the climatic conditions and quality of soil, the types of species shall be selected for plantation around the siding and along the roads. In addition to above some flowering plants, shrubs, herbs, and climber species shall also be planted for beautification of the siding area. Selected species should have faster growth, and helpful in soil and water conservation. A green belt of at least 15 meter width needs to be developed within siding peripheral area.

Greenbelt Development Plan: In order to capture the pollutants, a greenbelt along the periphery of siding area should be developed. General list of plants suggested

for green belt development is presented in **Table 6.3** and plant species for noise prone area is presented in **Table 6.4**. The general plan for development of greenbelt is summarized below:

- Native species having characteristics of attenuation of pollution & Fast growing tress shall be planted,
- Trees growing up to height of 10 m or more should be planted
- Row planting pattern of trees should be undertaken around the installation to prevent horizontal dispersion of pollutants,
- Trees should also be planted along roadsides, to arrest auto exhaust and noise pollution,
- Turfing of grass (lawn) for effective trapping and absorption of air pollutants,

TABLE 6.3
PLANTS SUGGESTED FOR GREEN BELT DEVELOPMENT

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Syzygium cumini*	Jamun
3	*Acacie nilotica*	Babul
4	*Dalbergia sisso*	Shisham
5	*Emblica officinalis*	Amla
6	*Pongamia pinnata*	Karanj
7	*Tectona grandis*	Sagwan
8	*Acacia arbacia*	Babool

TABLE 6.4
PLANT SPECIES FOR NOISE PRONE AREAS

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Aegle marmelos*	Bel
3	*Saraca indica*	Sita-Ashoka
4	*Dalbergia latifolia*	Shisham
5	*Albizzia lebbeck*	Siris
6	*Tectona grandis*	Teak
7	*Polyathiaa*	Ashoka
8	*Ficus religiose*	Peepal
9	*Magnifera indica*	Mango

6.3.8 Up-gradation of Existing Facilities

The potential pollution needs to be mitigated or curtailed at the point of source. This includes changes in system and personnel involved in handling the works. The material handling facilities consists of old infrastructure which needs to be replaced. These aging infrastructures may not be able to pursue in reducing leakages. New facilities should be aiming to include current best practice in leakage minimization. New improved techniques should be adopted.

6.3.9 Land Use

Integrated transportation and land use planning is an essential requirement to achieve a truly efficient freight system. With continued urban expansion it is essential that Sidings and Good-sheds should be identified to be relocated outside of urban centres due to anticipated future growth and pollution hazards.

6.3.10 Public Complaints

Despite widespread pollution intensive activities and receipt of numerous complaints, siding owners need to frame comprehensive guidelines relating to handling and transportation of pollution intensive commodities. To address the community complaints on pollution due to freight traffic and siding operation are the responsibility of siding owners. Appropriate response to the community complaints is likely to reduce the number of both ongoing and new pollution related community issues. Siding owners should prepare specific guidelines for handling of community complaints and this should include:

- Clear and regular communication with community groups, councils, forums and individuals to discuss the issues,
- Recording and attending the complaints, coordinating the response and providing a solution,
- Information on pollution mitigation initiatives being undertaken,
- Improved relations with local communities, councils and forums that raise the social responsibility profile and provide opportunity to better focus solutions to root cause of community perception and concerns.

6.3.11 Environmental Monitoring

Environmental monitoring should be the major component of the environmental policy formulated for sidings.

- Environmental monitoring will be undertaken by the concern siding owner on periodic basis,
- This monitoring will be undertaken in order to ensure compliance with all aspects or requirements of the Environmental Measures.
- Undertake external audits.
- Visual monitoring must be carried out periodically to ensure that the concerned activities create no impacts in and around the siding area.

6.3.12 Implementation of Environmental Management

The protection of environment will be the responsibility of siding owners. Siding owner shall develop an environmental management unit. The task of the unit would

be to supervise and co-ordinate implementation of environmental mitigation measures.

6.3.13 Education and Awareness Programs

Siding Owners must initiate the internal as well as external awareness programs involving all the stakeholders in controlling and enhancing the environment. This will include meetings, environmental forums on and off site to analyse dust generation events. Internal/External education and awareness for the management of pollution from siding activities shall help to improve operational proficiency in the handling of materials. Improved loading competency leads to reduce pollution.

Develop environmental awareness among operational and maintenance personnel associated with siding activities. Development of operator procedural training to implement revised and new unloading practices should be ensured to maintain the consistent work practices among all work personnel's involved in loading & unloading activities. An Environmental Awareness programme shall be implemented for all siding personnel to acquaint about the key environmental issues and potential impacts thereof. It will be ensured that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations within the siding area.

Environmental Awareness Plan should be such that, the goals setup by the management for pollution abetment be met. Management is responsible to formulate the procedure to carry out the pollution abatement program. Responsibility of management should be in strict compliance with the comprehensive training and programs. General environmental training is to ensure that employees and contractors [7] at each relevant function and level should receive environmental training and be aware of the environmental management initiatives undertaken during operations. Progress on compliance with the training program must be verified during the Management meetings. The various parameters for the training programs should include:

- Dust pollution Management
- Water management
- Waste management
- Spill management
- Complaint Management
- Incident reporting

[7] Contractor: Transportation Lorry owners, Tanker owners etc

CHAPTER – 7
PETROLEUM, OIL & LUBRICANTS (POL) SIDINGS

7.1 EXISTING OPERATION SYSTEM

7.1.1 Operating System

At all visited sidings, POL is being loaded by mechanical method (Gantry System). The installation provides with rail wagon filling sheds to facilitate loading. The wagons were loaded through hose pipe attached to the master valve of the wagons. The list of POL siding visited is given in the **Table 7.1**.

7.1.1.1 Pollution due to operating system

The point of source of pollution is leakages. No air pollution was noticed from operating system. At POL sidings the pollution source is in liquid form. The concreted pit between rail tracks receives leakage, through which it is stored in the tank through drain system and separated in Oil, Water Separator System (OWS). The treated POL is then reused or sold out. No dispersion of air pollutants have been noticed during field visit.

As discussed with the siding in-charge, there is always possibility of leakage and it depends upon the quantity of loading. At Mathura Refinary Siding, daily loading of POL is 3 rakes and leakage is about 250 liters per day. At Gujarat Refinary Siding, the daily loading of POL is 2 rakes and leakage is about 500 liters per day.

7.1.1.2 Pollution due to Haul Road

No air pollution due to haul road as activities is carried out through pipeline and wagons. The approach roads are in good condition.

7.1.2 Treatment System

7.1.2.1 Waste Water Collection System

At all the visited POL siding, leakage POL is being collected by drain system and separated at Oil, Water Separator System (OWS).

7.1.2.2 Solid Waste Disposal System

The domestic waste is collected in bins located at appropriate locations. The domestic waste is disposed off at landfill sites.

TABLE 7.1: POL SIDINGS VISITED

SI	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
1	Mathura refinery Siding, Mathura	NCR	POL, Bitumen	Gantry, Manual	2000 lit/day	Yes	No	No	PM	O&G	• Waste POL collected at Pit Drain & Recycled • Green Belt
2	Sri Nand Kumar & Sons, Bibinagar, Secundarabad	SCR	Coal, POL, Foodgrains	Mechanical Mechanical Manual	500 lit/day	Yes	No	No	PM	SS	
3	Gujarat Refinary Siding, Vadodara	WR	POL	Gantry	5000 lit/day	No	No	Yes	--	O&G	• Waste POL collected at Pit Drain & Recycled
4	POL Siding, Dhanbad	ECR	POL	Mechanical	200 lit/day	No	No	Yes	--	O&G	• POL collected in a tank through drain
5	NFST Siding	WR	HSD/Naphtha	Gantry	1000 lit/day	No	No	Yes	--	SS, O&G	• POL drain through channel & reuse • Green Belt
6	New Guwahati	NFR	Cement, Coal, POL	Manual & Mechanical (POL)	5000 lit/day	Yes	--	Yes	PM	--	• No system for POL waste • Natural trees

POL: Petroleum Oil and Lubricant

O&G: Oil & Grease

Naphtha: A volatile, colour less liquid obtained from petroleum distillation used as solvent in the manufacture of paint and as dry-cleaning fluid.

HSD: High Speed Diesel

7.1.2.3 Vegetation

The green belt is observed at Mathura Refinary siding and NFST siding. Scattered plantation is exists at other POL sidings.

7.1.2.4 Fire fighting system

The fire fighting system consisting of water pipelines, pump house, fire engines, water storage, foam storage for controlling and putting off any fire hazards have been observed at all POL Sidings.

7.2 ENVIRONMENTAL MANAGEMENT PLAN FOR POL SIDINGS

An attempt has been made to prepare the management plan on the basis of observations, available data and discussion made during field studies. Some impacts which were not identified during field visit due to unseen and unreported activities is also included for completeness of Environmental Management.

7.2.1 Noise Pollution Control

Noise dispersion is based upon the distance it travels. The major noise generating machineries/equipments are within definite boundary of railway siding area. Hence, noise has insignificant impact on the surrounding area. The major noise activities at siding are loading and unloading of wagon tankers, loader mechanism and auxillary facilities. However, due to some sidings which comes within city limits have some possibility of noise disturbance which can be protected through the following practices:

- Proper and timely maintenance of loading & unloading machineries,
- Provision of Green Belt for noise control,
- The operators and workers working in the high-noise areas shall be provided with ear-muffs/ear-plugs,
- The operator's cabins (control rooms) shall be properly (acoustically) insulated with special doors and observation windows,
- Acoustic laggings and silencers shall be provided in equipment wherever necessary,
- The silencers and mufflers of the individual machines shall be regularly checked,
- If generators will be used it should ensure that these machine /equipment meet the desired noise/vibration standards by providing noise absorbing material in enclosures,
- Provision of noise barrier if required,

The permissible limit for noise is given in the National Ambient Noise Quality Standards, CPCB. All the sidings/Goodsheds should comply with this standard. The National Ambient Noise Quality Standard is given in **the Annexure 4.2.**

7.2.2 Waste Water Environment

As observed during field visit at most of the sidings do not have proper waste water and storm water collection and disposal systems. The storm water should be chanellized properly to drain off the water from siding area. The waste water should be re-used for plantation, road washing after providing proper treatment. To conserve the water, following practices should be adopted:

- The work area should be concreted/stone pitched with proper gradient to channelize the runoff into storm water drain and to prevent ground water contamination,
- Provision of proper storm water management to ensure that pollutants and sediment are not carried into the nearby water bodies,
- The storm water drainage network must be kept separate from the sewage effluent system,
- Drainage must be controlled to ensure that runoff from the site will not culminate in offsite pollution, cause water damage to properties further down from the site or silting of any water resource.
- Provision of ETP to treat waters that have been contaminated due to presence of Oil / sludge / Grease / chemicals / sewage generated of different activities / operations in Petroleum Installations.
- In cases where facilities are linked to existing sewerage system, all necessary regulatory requirements should be adhered to,
- Loading gantry area including areas below railway lines shall be paved for smooth draining and collection of spillages into drains.
- Adoption rainwater harvesting scheme to recharge ground water,

7.2.3 Oil water separator (OWS)

Oil water separator is a system designed to separate gross amount of oil and suspended solids from the oily water effluent generated due to different activities/operations in Petroleum Installations. The receiving sump of the OWS shall have suitable arrangement for skimming off upper layer of accumulated oil. Provision shall be made for directing the collected oil to the slop tank.

A network of drainage system shall be provided to collect oil drains from various equipments, gantry areas, pump houses etc. They should also collect surface drains from places where oil spillages are likely to occur. The drainage shall lead to OWS / ETP as the case should be.

7.2.4 Solid Waste & Hazardous Waste management

Solid Waste Management:

- Solid wastes should be collected, segregated, transported and disposed at an authorized waste disposal facility,
- Temporarily storage facility should be designed in such a way that waste stored are not exposed to open atmosphere and are aesthetically acceptable,
- Storage bins should be painted green for biodegradable, blue for recyclable and red for non-biodegradable,
- Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the siding,
- Waste bins should be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance.
- Public awareness programme needs to be conducted for proper segregation of MSW at the source by way of conducting seminars/workshops.
- Under no circumstances, waste is to be burnt or buried on siding area.

Hazardous Material Storage & Waste Management:

- The storage area must be secured with restricted entry and all hazardous substances such as fuel, oils, chemicals, etc., must be stored therein. Drip trays, a thin concrete slab or a facility with PVC lining, must be installed in such storage areas with a view to prevent soil and water pollution,
- Soil contaminated by fuel leakage shall be removed and disposed of in an approved manner,
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- Provide proper warning signage to make people aware of the activities within the designated areas,
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- Training to staff on the safe disposal of hazardous waste
- Hazardous waste is to be disposed at a Permitted Hazardous Waste facility.

7.2.5 Soil Erosion

Soil erosion at siding site must be prevented by adopting proper measures at all times. Visual monitoring should be carried out through manual inspection and

photographic records. Visual monitoring should be carried out by staff with good observational skills and the ability to collect the reliable data for record and report. It should identify the areas where immediate action is required. The soil erosion should be controlled by the following actions:

- Suitable erosion control measures must be implemented in areas sensitive to erosion such as open areas and edges of slopes,
- The exposed soil areas should be vegetated to ensure that soil is protected from the erosion,
- The removal of vegetation, only if it is necessary,
- Preventing the unnecessary removal of vegetation especially on steep slopes,
- The suitable use of sand bags or jute sheets.

7.2.6 Green Belt Development

The greenbelt development plan aims at overall improvement in the environmental conditions of the region. The green belt helps to capture the fugitive emissions and attenuate the noise generated at site along with improving the aesthetics of the area. Green vegetation cover is beneficial in many ways, such as retention of soil moisture, prevention of soil erosion, recharge of ground water and moderation of microclimate.

Keeping in view the climatic conditions and quality of soil, the types of species shall be selected for plantation around the siding and along the roads. In addition to above some flowering plants, shrubs, herbs, and climber species shall also be planted for beautification of the siding area. Selected species should have faster growth, and helpful in soil and water conservation. A green belt of at least 15 meter width needs to be developed within siding peripheral area.

Greenbelt Development Plan: In order to capture the pollutants, a greenbelt along the periphery of siding area should be developed. General list of plants suggested for green belt development is presented in **Table 7.2** and plant species for noise prone area is presented in **Table 7.3**. The general plan for development of greenbelt is summarized below:

- Native species having characteristics of attenuation of pollution & Fast growing tress shall be planted,
- Trees growing up to height of 10 m or more should be planted
- Row planting pattern of trees should be undertaken around the installation to prevent horizontal dispersion of pollutants,
- Trees should also be planted along roadsides, to arrest auto exhaust and noise pollution,
- Turfing of grass (lawn) for effective trapping and absorption of air pollutants,

TABLE 7.2

PLANTS SUGGESTED FOR GREEN BELT DEVELOPMENT

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Syzygium cumini*	Jamun
3	*Acacie nilotica*	Babul
4	*Dalbergia sisso*	Shisham
5	*Emblica officinalis*	Amla
6	*Pongamia pinnata*	Karanj
7	*Tectona grandis*	Sagwan
8	*Acacia arbacia*	Babool

TABLE 7.3
PLANT SPECIES FOR NOISE PRONE AREAS

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Aegle marmelos*	Bel
3	*Saraca indica*	Sita-Ashoka
4	*Dalbergia latifolia*	Shisham
5	*Albizzia lebbeck*	Siris
6	*Tectona grandis*	Teak
7	*Polyathiaa*	Ashoka
8	*Ficus religiose*	Peepal
9	*Magnifera indica*	Mango

7.2.7 Up-gradation of Existing Facilities

The potential pollution needs to be mitigated or curtailed at the point of source. This includes changes in system and personnel involved in handling the works. The material handling facilities consists of old infrastructure which needs to be replaced. These aging infrastructures may not be able to pursue in reducing leakages. New facilities should be aiming to include current best practice in leakage minimization. New improved techniques should be adopted.

7.2.8 Land Use

Integrated transportation and land use planning is an essential requirement to achieve a truly efficient freight system. With continued urban expansion it is essential that Sidings should be identified to be relocated outside of urban centres due to anticipated future growth and pollution hazards.

7.2.9 Public Complaints

Despite widespread pollution intensive activities and receipt of numerous complaints, siding owners need to frame comprehensive guidelines relating to handling and transportation of pollution intensive commodities. To address the community complaints on pollution due to freight traffic and siding operation are the

responsibility of siding owners. Appropriate response to the community complaints is likely to reduce the number of both ongoing and new pollution related community issues. Siding owners should prepare specific guidelines for handling of community complaints and this should include:

- Clear and regular communication with community groups, councils, forums and individuals to discuss the issues,
- Recording and attending the complaints, coordinating the response and providing a solution,
- Information on pollution mitigation initiatives being undertaken,
- Improved relations with local communities, councils and forums that raise the social responsibility profile and provide opportunity to better focus solutions to root cause of community perception and concerns.

7.2.10 Environmental Monitoring

Environmental monitoring should be the major component of the environmental policy formulated for sidings.

- Environmental monitoring will be undertaken by the concern siding owner on periodic basis,
- This monitoring will be undertaken in order to ensure compliance with all aspects or requirements of the Environmental Measures.
- Undertake external audits.
- Visual monitoring must be carried out periodically to ensure that the concerned activities create no impacts in and around the siding area.

7.2.11 Implementation of Environmental Management

The protection of environment will be the responsibility of siding owners. Siding owner shall develop an environmental management unit. The task of the unit would be to supervise and co-ordinate implementation of environmental mitigation measures.

7.2.12 Education and Awareness Programs

Siding Owners must initiate the internal as well as external awareness programs involving all the stakeholders in controlling and enhancing the environment. This will include meetings, environmental forums on and off site to analyse dust generation events. Internal/External education and awareness for the management of pollution from siding activities shall help to improve operational proficiency in the handling of materials. Improved loading competency leads to reduce pollution.

Develop environmental awareness among operational and maintenance personnel associated with siding activities. Development of operator procedural training to implement revised and new unloading practices should be ensured to maintain the

consistent work practices among all work personnel's involved in loading & unloading activities. An Environmental Awareness programme shall be implemented for all siding personnel to acquaint about the key environmental issues and potential impacts thereof. It will be ensured that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations within the siding area.

Environmental Awareness Plan should be such that, the goals setup by the management for pollution abetment be met. Management is responsible to formulate the procedure to carry out the pollution abatement program. Responsibility of management should be in strict compliance with the comprehensive training and programs. General environmental training is to ensure that employees and contractors [8] at each relevant function and level should receive environmental training and be aware of the environmental management initiatives undertaken during operations. Progress on compliance with the training program must be verified during the Management meetings. The various parameters for the training programs should include:

- Water management
- Waste management
- Spill management
- Complaint Management
- Incident reporting

[8] Contractor: Transportation Lorry owners, Tanker owners etc

CHAPTER – 8
MINERAL SIDINGS

8.1 EXISTING OPERATION SYSTEM

8.1.1 Operating System

Mineral are either handled by mechanical means (JCB, Conveyor system and Silo) or manual system. The mineral is being transported through trucks or dumpers. The dumpers stack the minerals at designated place within siding area to facilitate easy loading. The mineral is then lifted through JCB or manually and put into wagon. At MSLP-AHB siding, the mineral is being handed by conveyor belt while at Formento siding it is through Silo. The **Figure 8.1** shows the mineral loading siding. The list of Mineral siding visited is given in the **Table 8.1**.

FIGURE 8.1
MINERAL SIDING

The intensity of pollution depends upon the material handling systems. The sources of pollution during handling process are operation system (i.e. loading and unloading), storage and haul roads.

8.1.1.1 Pollution due to Operating System

The density of Minerals are more than coal, hence the pollution impacts are less. The very fine particles are liable to create pollution. The activity of collection and loading in wagons creates pollution. During collection and lowering of minerals to wagon, the very fine loose particle (dust) is dispers. The dispersion of particles is limited to area and its further dispersion will be depending upon the wind speed and fineness of particles. The dispersion would generally be released relatively closer to ground level which would cause impacts in the immediate vicinity to limited distances. The siding where minerals are operated by conveyor belt system and Silo

shows very less pollution. The pollution will be possible during heavy wind and faulty operation system.

TABLE 8.1: MINERAL SIDINGS VISITED

SI	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
1	Ennore Port Limited, Chennai	SR	Iron Ore	Mechanical	8000 lit/day	Yes	No	No	PM	SS	• Water Sprinkler
2	Gopalpur ports Ltd	ECOR	Ilemenite	Manual	Not Available	No	No	No	PM	SS	
3	MSPL-AHB	SWR	Iron Ore	Conveyer Belt	5000 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkler
4	Formento	SWR	Iron Ore	Silo	10000 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkler
5	R. B.Mining	WCR	Clay	Manual	200 lit/day	Yes	Yes	No	PM	--	•

8.1.1.2 Haul Road

The approach roads at five siding were found in bad condition. Approach roads for the sidings were found dustier and poorly maintained. The water sprinkling facility was available at three siding; the scenario of air pollution due to haul road was almost similar to haul roads in the coal sidings.

8.1.2 Treatment System

8.1.2.1 Collection

No system was found to exist at any siding to collect the loose particles during loading and unloading activity.

8.1.2.2 Waste Water Collection System

No proper waste water collection and drainage system are exists. Hence, there is possibility to contaminate the soil and ground water.

8.1.2.3 Solid Waste Disposal System

No proper domestic solid waste collection and disposal facility is noticed. The particles left over at siding area are drained out during rainy days. This creates choking the community drainage system.

8.1.2.4 Vegetation

No vegetation cover was observed at any siding to control the dust particles.

8.2 ENVIRONMENTAL MANAGEMENT PLAN FOR MINERAL SIDINGS

An attempt has been made to prepare the management plan on the basis of observations, available data and discussion made during field studies. Some impacts which were not identified during field visit due to unseen and unreported activities are also included for completeness of Environmental Management.

8.2.1 Air Pollution Control

Dust control plan for loading and unloading mostly requires at coal, mineral and loose materials handling sidings. The dust control plan for various activities at siding is as follows:

Loading & Unloading: The intensity of dust pollution largely depends on the loading and unloading process at siding which has significant impact on environment. The adoption of following practice shall provide significant control on dust pollution:

- Provision of mechanized loading and unloading.

- An independent water spraying system should be established before loading and unloading.

Storage:

- Provide dust protection network i.e. wind screens all around the siding area for dust protection,
- Open storages may become sources of wind-generated dust hence these must be covered with polyethylene/canvas sheets during windy periods

Haul Roads: The major source of dust generation is due to wheel contact with road during vehicular movement. The management plan for minimizing haul road dust generation is as follows:

- An unpaved roads should be paved at the existing sidings on priority basis,
- Higher grading of main haul roads and service roads to clear accumulated loose material,
- Regular sprinkling of water on haul roads for dust suppression,
- The chemical suppressant can be used at the water scarcity places,
- Truck body washing system before entering and outing from siding area
- The trucks carrying minerals should be covered with the Tarpaulin.
- The trucks should not be filled to the top i.e. it should not be overloaded,
- Dust dislodgement from vehicular movement must be minimized by implementing speed limits,
- Vehicular movement at the siding area, shall be regulated effectively to avoid traffic congestion and to protect the workers from dust due to exposure in dusty environment,
- Emissions from the heavy duty vehicles operating in and out of siding shall follow the standard under Motor Vehicles Rules.
- Mineral transport through conveyors within siding shall have to be done under enclosed conditions,
- Afforestation with dust filtering trees around railway siding area for control of dust.

Dust emission from the various activities at siding is in the form of Particulate Matter PM_{10} and $PM_{2.5}$. The permissible limit for these parameters is given in the National Ambient Air Quality Standards, CPCB. All the air pollution parameters at sidings should comply with this standard. The National Ambient Air Quality Standard is given in the Annexure 4.1.

8.2.2 Noise Pollution Control

Noise dispersion is based upon the distance it travels. The major noise generating machineries/equipments are within definite boundary of railway siding area. Hence, noise has insignificant impact on the surrounding area. The major noise activities at siding are loading and unloading of wagons, loader vehicle and trucks movement.

However, due to some sidings which comes within city limits have some possibility of noise disturbance which can be protected through the following practices:

- Proper and timely maintenance of loading & unloading machineries,
- Provision of Green Belt for noise control,
- The operators and workers working in the high-noise areas shall be provided with ear-muffs/ear-plugs,
- The operator's cabins (control rooms) shall be properly (acoustically) insulated with special doors and observation windows,
- Acoustic laggings and silencers shall be provided in equipment wherever necessary,
- The silencers and mufflers of the individual machines shall be regularly checked,
- If generators will be used it should ensure that these machine /equipment meet the desired noise/vibration standards by providing noise absorbing material in enclosures,
- Provision of wind dust wall also acts as noise barrier to some extent,
- Restricting speed and preventing idling of transport vehicles,
- Use of high pressure horns operating within the siding and surrounding area shall be avoided

The permissible limit for noise is given in the National Ambient Noise Quality Standards, CPCB. The Noise quality at sidings should comply with this standard. The National Ambient Noise Quality Standard is given in the Annexure 4.2.

8.2.3 Waste Water Environment

The most of the sidings do not have proper waste water collection and disposal systems. The waste water is now being collected or drained off by unchannelled way and in some places it is accumulated within siding area, in simple tank or to connection with nearby drains. The waste water should be re-used for plantation, road washing or sprinkling after providing proper treatment. To conserve the water, following practices should be adopted:

- The stacking area should be concreted/stone pitched with proper gradient to channelize the runoff into storm water drain and to prevent ground water contamination,
- Efficient use of water spraying on haul roads i.e. before and after maximum frequency of traffic,
- Proper maintenance of open drainage system to avoid the choking,
- Provision of proper treatment to domestic effluent,
- Provision of proper storm water management at the siding to ensure that pollutants and sediment are not carried into the nearby water bodies,
- The storm water drainage network must be kept separate from the sewage effluent system,

- Drainage must be controlled to ensure that runoff from the site will not culminate in offsite pollution, cause water damage to properties further down from the site or silting of any water resource.
- In cases where facilities are linked to existing sewerage system, all necessary regulatory requirements should be adhered to,
- In case waste water contains any harmful substance which is harmful to the environment, the same shall be treated to remove so as to meet the prescribed norms,
- Adopt rainwater harvesting scheme to recharge ground water,

8.2.4 Solid Waste & Hazardous Waste management

Solid Waste Management:

- Solid wastes should be collected, segregated, transported and disposed at an authorized waste disposal facility,
- Temporarily storage facility should be designed in such a way that waste stored are not exposed to open atmosphere and are aesthetically acceptable,
- Storage bins should be painted green for biodegradable, blue for recyclable and red for non-biodegradable,
- Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the siding,
- Waste bins should be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance.
- Under no circumstances, waste is to be burnt or buried on siding area.

Hazardous Material Storage & Waste Management:

- The storage area must be secured with restricted entry and all hazardous substances such as fuel, oils, chemicals, etc., must be stored therein. Drip trays, a thin concrete slab or a facility with PVC lining, must be installed in such storage areas with a view to prevent soil and water pollution,
- Soil contaminated by fuel leakage shall be removed and disposed of in an approved manner,
- Petrochemicals, oils and identified hazardous substances shall only be stored under controlled conditions,
- Material Safety Data Sheets (MSDS) for onsite chemicals, hydrocarbon materials and / or waste and hazardous substances must be readily available. MSDS should include information pertaining to environmental impacts and measures to minimize and mitigate against any potential environmental impacts which may result from a spill,
- The management should prepare a method statement and plans for the storage of hazardous substances and emergency procedure,
- Storage of hazardous substances must not be within 100m of any drainage lines;

- Provide proper warning signage to make people aware of the activities within the designated areas,
- Spills should be cleaned up immediately to the satisfaction by removing the spillage together with the polluted soil and by disposing of it at a specified site,
- Training to staff on the safe disposal of hazardous waste and the use of spill kits.
- Hazardous waste is to be disposed at a Permitted Hazardous Waste Landfill Site.

8.2.5 Soil Erosion

Soil erosion at siding site must be prevented by adopting proper measures at all times. Visual monitoring should be carried out through manual inspection and photographic records. Visual monitoring should be carried out by staff with good observational skills and the ability to collect the reliable data for record and report. It should identify the areas where immediate action is required. The soil erosion should be controlled by the following actions:

- Suitable erosion control measures must be implemented in areas sensitive to erosion such as open areas and edges of slopes,
- The exposed soil areas should be vegetated to ensure that soil is protected from the erosion,
- The removal of vegetation, only if it is necessary,
- Preventing the unnecessary removal of vegetation especially on steep slopes,
- The suitable use of sand bags or jute sheets.

8.2.6 Green Belt Development

The greenbelt development plan aims at overall improvement in the environmental conditions of the region. The green belt helps to capture the fugitive emissions and attenuate the noise generated at site along with improving the aesthetics of the area. Green vegetation cover is beneficial in many ways, such as retention of soil moisture, prevention of soil erosion, recharge of ground water and moderation of microclimate. Another important role of green belt relates to containment of air pollution.

Keeping in view the climatic conditions and quality of soil, the types of species shall be selected for plantation around the siding and along the roads. In addition to above some flowering plants, shrubs, herbs, and climber species shall also be planted for beautification of the siding area. Selected species should have faster growth, and helpful in soil and water conservation. At existing railway sidings, a green belt of at least 15 meter width needs to be developed with immediate effect. Also, trees planted all along the connecting and approach roads restrict dust pollution due to movement of vehicles.

Greenbelt Development Plan: In order to capture the pollutants, a greenbelt along the periphery of siding area should be developed. General list of plants suggested for green belt development is presented in **Table 8.2** and plant species for noise prone area is presented in **Table 8.3**. The general plan for development of greenbelt is summarized below:

- Native species having characteristics of attenuation of pollution & Fast growing tress shall be planted,
- Trees growing up to height of 10 m or more should be planted around the siding area,
- Row planting pattern of trees should be undertaken around the installation to prevent horizontal dispersion of pollutants,
- Trees should also be planted along roadsides, to arrest auto exhaust and noise pollution,
- Turfing of grass (lawn) for effective trapping and absorption of air pollutants,
- The species identified for greenbelt development shall be planted using pitting technique.

TABLE 8.2
PLANTS SUGGESTED FOR GREEN BELT DEVELOPMENT

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Syzygium cumini*	Jamun
3	*Acacie nilotica*	Babul
4	*Dalbergia sisso*	Shisham
5	*Emblica officinalis*	Amla
6	*Pongamia pinnata*	Karanj
7	*Tectona grandis*	Sagwan
8	*Acacia arbacia*	Babool

TABLE 8.3
PLANT SPECIES FOR NOISE PRONE AREAS

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Aegle marmelos*	Bel
3	*Saraca indica*	Sita-Ashoka
4	*Dalbergia latifolia*	Shisham
5	*Albizzia lebbeck*	Siris
6	*Tectona grandis*	Teak
7	*Polyathiaa*	Ashoka
8	*Ficus religiose*	Peepal
9	*Magnifera indica*	Mango

8.2.7 Up-gradation of Existing Facilities

The potential pollution needs to be mitigated or curtailed at the point of source. This includes changes in system and personnel involved in handling the works. The material handling facilities consists of old infrastructure should be replaced. These aging infrastructures may not be able to pursue in reducing dust generation. New

facilities should be aiming to include current best practice in dust minimization. The faulty and un-operational arrangement at siding needs to be replaced. Those arrangements which are not replaceable should be replaced with new improved techniques available and suitable.

8.2.8 Land Use

Integrated transportation and land use planning is an essential requirement to achieve a truly efficient freight system. With continued urban expansion it is essential that Sidings should be identified to be relocated outside of urban centres due to anticipated future growth and pollution hazards.

8.2.9 Public Complaints

Despite widespread pollution intensive activities and receipt of numerous complaints, siding owners need to frame comprehensive guidelines relating to handling and transportation of pollution intensive commodities. To address the community complaints on pollution due to freight traffic and siding operation are the responsibility of siding owners. Appropriate response to the community complaints is likely to reduce the number of both ongoing and new pollution related community issues. Siding owners should prepare specific guidelines for handling of community complaints and this should include:

- Clear and regular communication with community groups, councils, forums and individuals to discuss the issues,
- Recording and attending the complaints, coordinating the response and providing a solution,
- Information on pollution mitigation initiatives being undertaken,
- Improved relations with local communities, councils and forums that raise the social responsibility profile and provide opportunity to better focus solutions to root cause of community perception and concerns.

8.2.10 Environmental Monitoring

Environmental monitoring should be the major component of the environmental policy formulated for sidings.

- Environmental monitoring will be undertaken by the concern siding owner on periodic basis,
- This monitoring will be undertaken in order to ensure compliance with all aspects or requirements of the Environmental Measures.
- Undertake external audits.
- Visual monitoring must be carried out periodically to ensure that the concerned activities create no impacts in and around the siding area.

8.2.11 Implementation of Environmental Management

The protection of environment will be the responsibility of siding owners. Siding owner shall develop an environmental management unit. The task of the unit would be to supervise and co-ordinate implementation of environmental mitigation measures.

8.2.12 Education and Awareness Programs

Siding Owners must initiate the internal as well as external awareness programs involving all the stakeholders in controlling and enhancing the environment. This will include meetings, environmental forums on and off site to analyse dust generation events. Internal/External education and awareness for the management of pollution from siding activities shall help to improve operational proficiency in the handling of materials. Improved loading competency leads to reduce pollution.

Develop environmental awareness among operational and maintenance personnel associated with siding activities. Development of operator procedural training to implement revised and new unloading practices should be ensured to maintain the consistent work practices among all work personnel's involved in loading & unloading activities. An Environmental Awareness programme shall be implemented for all siding personnel to acquaint about the key environmental issues and potential impacts thereof. It will be ensured that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations within the siding area.

Environmental Awareness Plan should be such that, the goals setup by the management for pollution abetment be met. Management is responsible to formulate the procedure to carry out the pollution abatement program. Responsibility of management should be in strict compliance with the comprehensive training and programs. General environmental training is to ensure that employees and contractors [9] at each relevant function and level should receive environmental training and be aware of the environmental management initiatives undertaken during operations. Progress on compliance with the training program must be verified during the Management meetings. The various parameters for the training programs should include:

- Dust management
- Water management
- Waste management
- Spill management
- Complaint Management
- Incident reporting

[9] Contractor: Transportation Lorry owners, Tanker owners etc

CHAPTER – 9

INDUSTRIAL MATERIAL SIDINGS

9.1 EXISTING OPERATION SYSTEM

9.1.1 Operating System

Major industrial materials are loaded & unloaded through mechanical arrangement such as moving loading arms (Gantry Girders) and Cranes. At four siding visited, the operation was mechanical means. The **Figure 9.1** shows the engineering material handling siding. The list of Industrial Material siding visited is given in the **Table 9.1**.

FIGURE 9.1
INDUSTRIAL MATERIAL RAILWAY SIDING

The intensity of dust pollution depends upon the type of commodity and handling systems. The sources of pollution in the handling process are operation system, storage and haul roads.

9.1.1.1 Pollution due to Operating System

No pollution due to operating system was noticed during field visit. The possible pollution was due to fugitive emission from machineries.

9.1.1.1 Haul Road

During field visits it was noticed that, the approach roads at four siding were in bad condition. Approach roads for the sidings were found to be dustier and poorly maintained.

TABLE 9.1: INDUSTRIAL MATERIAL SIDINGS VISITED

SI	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
1	Kapilas Road	ECOR	Steel	Crane		No	No	No	--	--	
2	Kaipadar Road	ECOR	Sleepers (Pre-stressed)	Gantry Girder	500 lit/day	No	No	No	--	--	
3	Hindustan Salt Ltd, Viramjam, Gujarat	WR	Industrial Material, Salt	Manual, JCB	200 lit/day	Yes	No	No	PM	SS	
4	Container Siding, Fatuha	ECR	Containers of Iron & Steel (Wrought)	Mechanical		No	No	No	--	--	

9.1.2 Treatment System

9.1.2.1 Waste Water Collection System

No proper waste water and drainage collection system was observed during visit. The oil wastes which were left over from the operating machineries is not collected and disposed properly. The photographs showing oil waste is shown in **Figure 9.2**.

FIGURE 9.2
OIL WASTE AT RAILWAY SIDINGS

9.1.2.2 Solid Waste Disposal System

No solid waste collection and disposal facility were found. The waste material which left over during loading or unloading is not disposed properly. The waste material from concrete sleepers is observed at one of the siding and shown in **Figure 9.3**.

FIGURE 9.3
WASTE MATERIAL AT RAILWAY SIDINGS

9.1.2.3 Vegetation

No vegetation cover was observed at any of the sidings.

9.2 ENVIRONMENTAL MANAGEMENT PLAN FOR INDUSTRIAL MATERIAL SIDINGS

An attempt has been made to prepare the management plan on the basis of observations, available data and discussion made during field studies. Some impacts which were not identified during field visit due to unseen and unreported activities are also included for completeness of Environmental Management.

9.2.1 Air Pollution Control

The sources of pollution were mostly from haul roads. The dust control plan for various activities at siding is as follows:

9.2.1.1 Haul Roads

The major source of dust generation is due to wheel contact with road during vehicular movement. The management plan for minimizing haul road dust generation is as follows:

- An unpaved roads should be paved at the existing sidings,
- Higher grading of main haul roads and service roads to clear accumulated loose material,
- Regular sprinkling of water on haul roads for dust suppression,
- Dust dislodgement from vehicular movement must be minimized by implementing speed limits,
- The trucks should be covered with the Tarpaulin. Strict action should be taken if the rules are not followed,
- Truck body washing system before entering and outing from siding area
- Vehicular movement at the siding area, shall be regulated effectively to avoid traffic congestion and to protect the workers from dust due to exposure in dusty environment,
- Emissions from the heavy duty vehicles operating in and out of siding shall follow the standard under Motor Vehicles Rules.
- Afforestation with dust filtering trees around railway siding area for control of dust.

Dust emission from the various activities at siding is in the form of Particulate Matter PM_{10} and $PM_{2.5}$. The permissible limit for these parameters is given in the National Ambient Air Quality Standards, CPCB. All the air pollution parameters at sidings should comply with this standard. The National Ambient Air Quality Standard is given in the Annexure 4.1.

9.2.2 Noise Pollution Control

Noise dispersion is based upon the distance it travels. The major noise generating machineries/equipments are within definite boundary of railway siding area. Hence, noise has insignificant impact on the surrounding area. The major noise activities at siding are loading and unloading of wagons, loader vehicle and trucks movement. However, due to some sidings which comes within city limits have some possibility of noise disturbance which can be protected through the following practices:

- Proper and timely maintenance of loading & unloading machineries,
- Provision of Green Belt for noise control,
- The operators and workers working in the high-noise areas shall be provided with ear-muffs/ear-plugs,
- The operator's cabins (control rooms) shall be properly (acoustically) insulated with special doors and observation windows,
- Acoustic laggings and silencers shall be provided in equipment wherever necessary,
- The silencers and mufflers of the individual machines shall be regularly checked,
- If generators will be used it should ensure that these machine /equipment meet the desired noise/vibration standards by providing noise absorbing material in enclosures,
- Provision of wind dust wall also acts as noise barrier to some extent,
- Restricting speed and preventing idling of transport vehicles,
- Use of high pressure horns operating within the siding and surrounding area shall be avoided

The permissible limit for noise is given in the National Ambient Noise Quality Standards, CPCB. All the sidings/Goodsheds should comply with this standard. The National Ambient Noise Quality Standard is given in the Annexure 4.2.

9.2.3 Waste Water Environment

The most of the sidings do not have proper waste water collection and disposal systems. The waste water is now being collected or drained off by unchannelled way and in some places it is accumulated within siding area, in simple tank or to connection with nearby drains. The waste water should be re-used for plantation, road washing or sprinkling after providing proper treatment. To conserve the water, following practices should be adopted:

- The siding area should be concreted/stone pitched with proper gradient to channelize the runoff into storm water drain and to prevent ground water contamination,

- Efficient use of water spraying on haul roads i.e. before and after maximum frequency of traffic,
- Provision of proper storm water management at the siding to ensure that pollutants and sediment are not carried into the nearby water bodies,
- The storm water drainage network must be kept separate from the sewage effluent system,
- Drainage must be controlled to ensure that runoff from the site will not culminate in offsite pollution, cause water damage to properties further down from the site or silting of any water resource.
- In cases where facilities are linked to existing sewerage system, all necessary regulatory requirements should be adhered to,
- In case waste water contains any harmful substance which is harmful to the environment, the same shall be treated to remove so as to meet the prescribed norms,
- Adoption rainwater harvesting scheme to recharge ground water,

9.2.4 Solid Waste & Hazardous Waste management

Solid Waste Management:

- The left over material during loading and unloading should have proper collection, reuse and disposal facility,
- All the solid wastes should be collected, segregated, transported and disposed at an authorized waste disposal facility,
- Temporarily storage facility should be designed in such a way that waste stored are not exposed to open atmosphere and are aesthetically acceptable,
- Storage bins should be painted green for biodegradable, blue for recyclable and red for non-biodegradable,
- Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the siding,
- Waste bins should be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance.
- Public awareness programme needs to be conducted for proper segregation of MSW at the source by way of conducting seminars/workshops.
- Under no circumstances, waste is to be burnt or buried on siding area.

Hazardous Material Storage & Waste Management:

- The storage area must be secured with restricted entry and all hazardous substances such as fuel, oils, chemicals, etc., must be stored therein. Drip trays, a thin concrete slab or a facility with PVC lining, must be installed in such storage areas with a view to prevent soil and water pollution,
- Soil contaminated by fuel leakage shall be removed and disposed of in an approved manner,

- Petrochemicals, oils and identified hazardous substances shall only be stored under controlled conditions,
- Material Safety Data Sheets (MSDS) for onsite chemicals, hydrocarbon materials and / or waste and hazardous substances must be readily available. MSDS should include information pertaining to environmental impacts and measures to minimize and mitigate against any potential environmental impacts which may result from a spill,
- The management should prepare a method statement and plans for the storage of hazardous substances and emergency procedure,
- Storage of hazardous substances must not be within 100m of any drainage lines;
- Provide proper warning signage to make people aware of the activities within the designated areas,
- Spills should be cleaned up immediately to the satisfaction by removing the spillage together with the polluted soil and by disposing of it at a specified site,
- Training to staff on the safe disposal of hazardous waste
- Hazardous waste is to be disposed at a Permitted Hazardous Waste facility.

9.2.5 Soil Erosion

Soil erosion at siding site must be prevented by adopting proper measures at all times. Visual monitoring should be carried out through manual inspection and photographic records. Visual monitoring should be carried out by staff with good observational skills and the ability to collect the reliable data for record and report. It should identify the areas where immediate action is required. The soil erosion should be controlled by the following actions:

- Suitable erosion control measures must be implemented in areas sensitive to erosion such as open areas and edges of slopes,
- The exposed soil areas should be vegetated to ensure that soil is protected from the erosion,
- The removal of vegetation, only if it is necessary,
- Preventing the unnecessary removal of vegetation especially on steep slopes,
- The suitable use of sand bags or jute sheets.

9.2.6 Green Belt Development

The greenbelt development plan aims at overall improvement in the environmental conditions of the region. The green belt helps to capture the fugitive emissions and attenuate the noise generated at site along with improving the aesthetics of the area. Green vegetation cover is beneficial in many ways, such as retention of soil moisture, prevention of soil erosion, recharge of ground water and moderation of microclimate.

Keeping in view the climatic conditions and quality of soil, the types of species shall be selected for plantation around the siding and along the roads. In addition to above some flowering plants, shrubs, herbs, and climber species shall also be planted for beautification of the siding area. Selected species should have faster growth, and helpful in soil and water conservation. A green belt of at least 15 meter width needs to be developed within siding peripheral area.

Greenbelt Development Plan: In order to capture the pollutants, a greenbelt along the periphery of siding area should be developed. General list of plants suggested for green belt development is presented in **Table 9.2** and plant species for noise prone area is presented in **Table 9.3**. The general plan for development of greenbelt is summarized below:

- Native species having characteristics of attenuation of pollution & Fast growing tress shall be planted,
- Trees growing up to height of 10 m or more should be planted
- Row planting pattern of trees should be undertaken around the installation to prevent horizontal dispersion of pollutants,
- Trees should also be planted along roadsides, to arrest auto exhaust and noise pollution,
- Turfing of grass (lawn) for effective trapping and absorption of air pollutants,

TABLE 9.2
PLANTS SUGGESTED FOR GREEN BELT DEVELOPMENT

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Syzygium cumini*	Jamun
3	*Acacie nilotica*	Babul
4	*Dalbergia sisso*	Shisham
5	*Emblica officinalis*	Amla
6	*Pongamia pinnata*	Karanj
7	*Tectona grandis*	Sagwan
8	*Acacia arbacia*	Babool

TABLE 9.3
PLANT SPECIES FOR NOISE PRONE AREAS

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Aegle marmelos*	Bel
3	*Saraca indica*	Sita-Ashoka
4	*Dalbergia latifolia*	Shisham
5	*Albizzia lebbeck*	Siris
6	*Tectona grandis*	Teak
7	*Polyathiaa*	Ashoka
8	*Ficus religiose*	Peepal
9	*Magnifera indica*	Mango

9.2.7 Up-gradation of Existing Facilities

The potential pollution needs to be mitigated or curtailed at the point of source. This includes changes in system and personnel involved in handling the works. The material handling facilities consists of old infrastructure which needs to be replaced. These aging infrastructures may not be able to pursue in reducing leakages. New facilities should be aiming to include current best practice in leakage minimization. New improved techniques should be adopted.

9.2.8 Land Use

Integrated transportation and land use planning is an essential requirement to achieve a truly efficient freight system. With continued urban expansion it is essential that Sidings and Good-sheds should be identified to be relocated outside of urban centres due to anticipated future growth and pollution hazards.

9.2.9 Public Complaints

Despite widespread pollution intensive activities and receipt of numerous complaints, siding owners need to frame comprehensive guidelines relating to handling and transportation of pollution intensive commodities. To address the community complaints on pollution due to freight traffic and siding operation are the responsibility of siding owners. Appropriate response to the community complaints is likely to reduce the number of both ongoing and new pollution related community issues. Siding owners should prepare specific guidelines for handling of community complaints and this should include:

- Clear and regular communication with community groups, councils, forums and individuals to discuss the issues,
- Recording and attending the complaints, coordinating the response and providing a solution,
- Information on pollution mitigation initiatives being undertaken,
- Improved relations with local communities, councils and forums that raise the social responsibility profile and provide opportunity to better focus solutions to root cause of community perception and concerns.

9.2.10 Environmental Monitoring

Environmental monitoring should be the major component of the environmental policy formulated for sidings.

- Environmental monitoring will be undertaken by the concern siding owner on periodic basis,

- This monitoring will be undertaken in order to ensure compliance with all aspects or requirements of the Environmental Measures.
- Undertake external audits.
- Visual monitoring must be carried out periodically to ensure that the concerned activities create no impacts in and around the siding area.

6.2.11 Implementation of Environmental Management

The protection of environment will be the responsibility of siding owners. Siding owner shall develop an environmental management unit. The task of the unit would be to supervise and co-ordinate implementation of environmental mitigation measures.

9.2.12 Education and Awareness Programs

Siding Owners must initiate the internal as well as external awareness programs involving all the stakeholders in controlling and enhancing the environment. This will include meetings, environmental forums on and off site to analyse dust generation events. Internal/External education and awareness for the management of pollution from siding activities shall help to improve operational proficiency in the handling of materials. Improved loading competency leads to reduce pollution.

Develop environmental awareness among operational and maintenance personnel associated with siding activities. Development of operator procedural training to implement revised and new unloading practices should be ensured to maintain the consistent work practices among all work personnel's involved in loading & unloading activities. An Environmental Awareness programme shall be implemented for all siding personnel to acquaint about the key environmental issues and potential impacts thereof. It will be ensured that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations within the siding area.

Environmental Awareness Plan should be such that, the goals setup by the management for pollution abetment be met. Management is responsible to formulate the procedure to carry out the pollution abatement program. Responsibility of management should be in strict compliance with the comprehensive training and programs. General environmental training is to ensure that employees and contractors [10] at each relevant function and level should receive environmental training and be aware of the environmental management initiatives undertaken during operations. Progress on compliance with the training program must be verified during the Management meetings. The various parameters for the training programs should include:

[10] Contractor: Transportation Lorry owners, Tanker owners etc

- Dust pollution Management
- Water management
- Waste management
- Spill management
- Complaint Management
- Incident reporting

CHAPTER – 10
COMMON MATERIAL SIDINGS

10.1 EXISTING OPERATION SYSTEM

10.1.1 Operating System

The six sidings of handling mixed commodities except POL were visited. Manual loading/unloading of materials was observed at all visited sidings. The list of siding visited is given in the **Table 10.1**. The commodities like onion, sugar, edible oil etc are in packed form. The commodities are temporarily stored at open tin sheds. The loading/unloading activity is carried out through head loads or change of head loads. Sometimes, the loading is carried out directly from the truck to the wagons. The common material loading siding is shown in the **Figure 10.1**.

FIGURE 10.1
COMMON MATERIAL HANDLING SIDING

10.1.1.1 Pollution due to operating system

The point of source of pollution was leakage. No air pollution was noticed during operating system at siding.

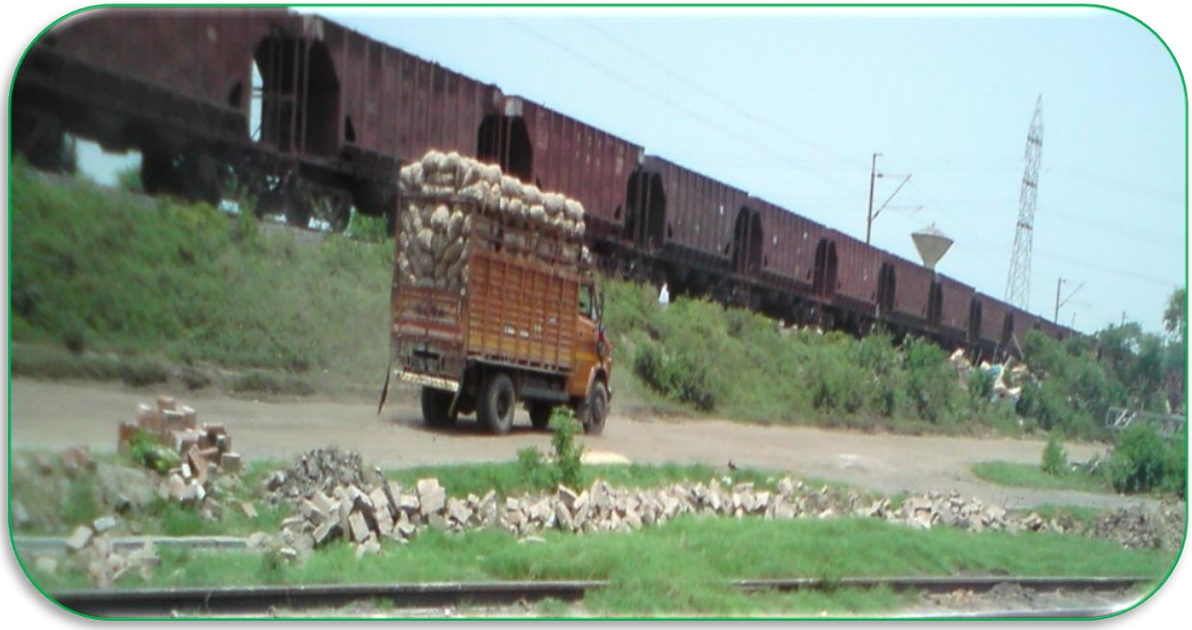
10.1.1.2 Pollution due to Haul Road

The pollution at siding was due to unpaved road. The dust particles of soil are the major source of pollution. It was noticed during visit that, the haul roads are unpaved and not maintained. The haul road at one of the siding is shown in **Figure 10.2**.

TABLE 10.1: COMMON MATERIAL SIDINGS VISITED

SI	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
1	Dankuni, kalkatta	SW	Edible oil, Stone, Coal tar, onion, Cement, Sugar, Maze, Wheat, Spunj Iron, Pig Iron, Jipsum	Manual	Not Available	No	Yes	No	--	SS	--
2	Goodshed, Buxar	ECR	All Commodities except POL	Manual	100 lit/day	Yes	Yes	No	PM	SS	--
3	Goodshed	ECR	All Commodities except POL	Manual	150 lit/day	Yes	Yes	No	PM	SS	--
4	FCI siding, Mokama, Patna	ECR	All Commodities except POL	Manual	100 lit/day	Yes	Yes	No	PM	SS	--
5	Sardarnagar	NER	Wheat, Clinker, Salt	Manual	100 lit/day	Yes	--	No	PM	--	--
6	Railway Siding, Ajmer Division	NWR	SSP, Wheat	Manual	200 lit/day	No	No	No	No	--	• Bagged product

FIGURE 10.2
HAUL ROAD CONDITION AT SIDING



10.1.2 Treatment System

10.1.2.1 Leakage waste collection

No system exists to collect the leakage waste due to loading and unloading activity. Only the valuable leakage material was collected. The system also exists in which, leakage is collected by slum dwellers or people living in nearby villages.

10.1.2.2 Waste Water System

No proper waste collection system and the drainage system are observed during visit except at Dankuni, Calcutta. The Waste water collection system at Dankuni siding, Calcutta is shown in **Figure 10.3**. The waste water gets collected in drain and connected to the nearby community drains. No treatment of waste water is available.

FIGURE 10.3
WASTE WATER COLLECTION SYSTEM

10.1.2.3 Solid Waste Disposal System

No proper domestic solid waste collection and disposal facility is noticed. It is observed that at Dankuni siding, the residual waste is stored at siding shed itself and no facility is available for their disposal. Such residual waste is shown in **Figure 10.4**.

FIGURE 10.4
RESIDUAL WASTE AT SIDING

10.1.2.4 Vegetation

No vegetation cover is observed at any siding to control the haul road dust.

10.2 ENVIRONMENTAL MANAGEMENT PLAN FOR COMMON MATERIAL SIDINGS

An attempt has been made to prepare the management plan on the basis of observations, available data and discussion made during field studies. Some impacts which were not identified during field visit due to unseen and unreported activities are also included for completeness of Environmental Management.

10.2.1 Air Pollution Control

The sources of pollution are mostly from haul roads. The dust control plan at siding is as follows:

10.2.1.1 Haul Roads

The major source of dust generation is due to wheel contact with road during vehicular movement. The management plan for minimizing haul road dust generation is as follows:

- An unpaved roads should be paved at the existing sidings,
- Higher grading of main haul roads and service roads to clear accumulated loose material,
- Regular sprinkling of water on haul roads for dust suppression,
- Dust dislodgement from vehicular movement must be minimized by implementing speed limits,
- The trucks should be covered with the Tarpaulin. Strict action should be taken if the rules are not followed,
- Truck body washing system before entering and outing from siding area
- Vehicular movement at the siding area, shall be regulated effectively to avoid traffic congestion and to protect the workers from dust due to exposure in dusty environment,
- Emissions from the heavy duty vehicles operating in and out of siding shall follow the standard under Motor Vehicles Rules.
- Afforestation with dust filtering trees around railway siding area for control of dust.

Dust emission from the various activities at siding is in the form of Particulate Matter PM_{10} and $PM_{2.5}$. The permissible limit for these parameters is given in the National Ambient Air Quality Standards, CPCB. All the air pollution parameters at sidings should comply with this standard. The National Ambient Air Quality Standard is given in the Annexure 4.1.

10.2.2 Noise Pollution Control

Noise dispersion is based upon the distance it travels. The major noise generating machineries/equipments are within definite boundary of railway siding area. Hence, noise has insignificant impact on the surrounding area. The major noise activities at siding are loading and unloading of wagons, loader vehicle and trucks movement. However, due to some sidings which comes within city limits have some possibility of noise disturbance which can be protected through the following practices:

- Proper and timely maintenance of loading & unloading machineries,
- Provision of Green Belt for noise control,
- The operators and workers working in the high-noise areas shall be provided with ear-muffs/ear-plugs,
- The operator's cabins (control rooms) shall be properly (acoustically) insulated with special doors and observation windows,
- Acoustic laggings and silencers shall be provided in equipment wherever necessary,
- The silencers and mufflers of the individual machines shall be regularly checked,
- If generators will be used it should ensure that these machine /equipment meet the desired noise/vibration standards by providing noise absorbing material in enclosures,
- Provision of wind dust wall also acts as noise barrier to some extent,
- Restricting speed and preventing idling of transport vehicles,
- Use of high pressure horns operating within the siding and surrounding area shall be avoided

The permissible limit for noise is given in the National Ambient Noise Quality Standards, CPCB. All the sidings/Goodsheds should comply with this standard. The National Ambient Noise Quality Standard is given in the Annexure 4.2.

10.2.3 Waste Water Environment

The most of the sidings do not have proper waste water collection and disposal systems. The waste water was being collected or drained off by unchannelled way and in some places it has been accumulated within siding area, in simple tank or to connection with nearby drains. The waste water should be re-used for plantation, road washing or sprinkling after providing proper treatment. To conserve the water, following practices should be adopted:

- The siding area should be concreted/stone pitched with proper gradient to channelize the runoff into storm water drain and to prevent ground water contamination,
- Efficient use of water spraying on haul roads i.e. before and after maximum frequency of traffic,

- Provision of proper storm water management at the siding to ensure that pollutants and sediment are not carried into the nearby water bodies,
- The storm water drainage network must be kept separate from the sewage effluent system,
- Drainage must be controlled to ensure that runoff from the site will not culminate in offsite pollution, cause water damage to properties further down from the site or silting of any water resource.
- In cases where facilities are linked to existing sewerage system, all necessary regulatory requirements should be adhered to,
- In case waste water contains any harmful substance which is harmful to the environment, the same shall be treated to remove so as to meet the prescribed norms,
- Adoption rainwater harvesting scheme to recharge ground water,

10.2.4 Solid Waste & Hazardous Waste management

Solid Waste Management:

- The left over material during loading and unloading should have proper collection, reuse and disposal facility,
- All the solid wastes should be collected, segregated, transported and disposed at an authorized waste disposal facility,
- Temporarily storage facility should be designed in such a way that waste stored are not exposed to open atmosphere and are aesthetically acceptable,
- Storage bins should be painted green for biodegradable, blue for recyclable and red for non-biodegradable,
- Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the siding,
- Waste bins should be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance.
- Public awareness programme needs to be conducted for proper segregation of MSW at the source by way of conducting seminars/workshops.
- Under no circumstances, waste is to be burnt or buried on siding area.

Hazardous Material Storage & Waste Management:

- The storage area must be secured with restricted entry and all hazardous substances such as fuel, oils, chemicals, etc., must be stored therein. Drip trays, a thin concrete slab or a facility with PVC lining, must be installed in such storage areas with a view to prevent soil and water pollution,
- Soil contaminated by fuel leakage shall be removed and disposed of in an approved manner,
- Petrochemicals, oils and identified hazardous substances shall only be stored under controlled conditions,

- Material Safety Data Sheets (MSDS) for onsite chemicals, hydrocarbon materials and / or waste and hazardous substances must be readily available. MSDS should include information pertaining to environmental impacts and measures to minimize and mitigate against any potential environmental impacts which may result from a spill,
- The management should prepare a method statement and plans for the storage of hazardous substances and emergency procedure,
- Storage of hazardous substances must not be within 100m of any drainage lines;
- Provide proper warning signage to make people aware of the activities within the designated areas,
- Spills should be cleaned up immediately to the satisfaction by removing the spillage together with the polluted soil and by disposing of it at a specified site,
- Training to staff on the safe disposal of hazardous waste
- Hazardous waste is to be disposed at a Permitted Hazardous Waste facility.

10.2.5 Soil Erosion

Soil erosion at siding site must be prevented by adopting proper measures at all times. Visual monitoring should be carried out through manual inspection and photographic records. Visual monitoring should be carried out by staff with good observational skills and the ability to collect the reliable data for record and report. It should identify the areas where immediate action is required. The soil erosion should be controlled by the following actions:

- Suitable erosion control measures must be implemented in areas sensitive to erosion such as open areas and edges of slopes,
- The exposed soil areas should be vegetated to ensure that soil is protected from the erosion,
- The removal of vegetation, only if it is necessary,
- Preventing the unnecessary removal of vegetation especially on steep slopes,
- The suitable use of sand bags or jute sheets.

10.2.6 Green Belt Development

The greenbelt development plan aims at overall improvement in the environmental conditions of the region. The green belt helps to capture the fugitive emissions and attenuate the noise generated at site along with improving the aesthetics of the area. Green vegetation cover is beneficial in many ways, such as retention of soil moisture, prevention of soil erosion, recharge of ground water and moderation of microclimate.

Keeping in view the climatic conditions and quality of soil, the types of species shall be selected for plantation around the siding and along the roads. In addition to above some flowering plants, shrubs, herbs, and climber species shall also be planted for

beautification of the siding area. Selected species should have faster growth, and helpful in soil and water conservation. A green belt of at least 15 meter width needs to be developed within siding peripheral area.

Greenbelt Development Plan: In order to capture the pollutants, a greenbelt along the periphery of siding area should be developed. General list of plants suggested for green belt development is presented in **Table 10.2** and plant species for noise prone area is presented in **Table 10.3**. The general plan for development of greenbelt is summarized below:

- Native species having characteristics of attenuation of pollution & Fast growing tress shall be planted,
- Trees growing up to height of 10 m or more should be planted
- Row planting pattern of trees should be undertaken around the installation to prevent horizontal dispersion of pollutants,
- Trees should also be planted along roadsides, to arrest auto exhaust and noise pollution,
- Turfing of grass (lawn) for effective trapping and absorption of air pollutants,

TABLE 10.2
PLANTS SUGGESTED FOR GREEN BELT DEVELOPMENT

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Syzygium cumini*	Jamun
3	*Acacie nilotica*	Babul
4	*Dalbergia sisso*	Shisham
5	*Emblica officinalis*	Amla
6	*Pongamia pinnata*	Karanj
7	*Tectona grandis*	Sagwan
8	*Acacia arbacia*	Babool

TABLE 10.3
PLANT SPECIES FOR NOISE PRONE AREAS

Sr.No	Botanical Name	Common Name
1	*Azadirachta indica*	Neem
2	*Aegle marmelos*	Bel
3	*Saraca indica*	Sita-Ashoka
4	*Dalbergia latifolia*	Shisham
5	*Albizzia lebbeck*	Siris
6	*Tectona grandis*	Teak
7	*Polyathiaa*	Ashoka
8	*Ficus religiose*	Peepal
9	*Magnifera indica*	Mango

10.2.7 Up-gradation of Existing Facilities

The potential pollution needs to be mitigated or curtailed at the point of source. This includes changes in system and personnel involved in handling the works. The material handling facilities consists of old infrastructure which needs to be replaced. These aging infrastructures may not be able to pursue in reducing leakages. New facilities should be aiming to include current best practice in leakage minimization. New improved techniques should be adopted.

10.2.8 Land Use

Integrated transportation and land use planning is an essential requirement to achieve a truly efficient freight system. With continued urban expansion it is essential that Sidings and Good-sheds should be identified to be relocated outside of urban centres due to anticipated future growth and pollution hazards.

10.2.9 Public Complaints

Despite widespread pollution intensive activities and receipt of numerous complaints, siding owners need to frame comprehensive guidelines relating to handling and transportation of pollution intensive commodities. To address the community complaints on pollution due to freight traffic and siding operation are the responsibility of siding owners. Appropriate response to the community complaints is likely to reduce the number of both ongoing and new pollution related community issues. Siding owners should prepare specific guidelines for handling of community complaints and this should include:

Clear and regular communication with community groups, councils, forums and individuals to discuss the issues,

- Recording and attending the complaints, coordinating the response and providing a solution,
- Information on pollution mitigation initiatives being undertaken,
- Improved relations with local communities, councils and forums that raise the social responsibility profile and provide opportunity to better focus solutions to root cause of community perception and concerns.

10.2.10 Environmental Monitoring

Environmental monitoring should be the major component of the environmental policy formulated for sidings.

- Environmental monitoring will be undertaken by the concern siding owner on periodic basis,
- This monitoring will be undertaken in order to ensure compliance with all aspects or requirements of the Environmental Measures.
- Undertake external audits.

- Visual monitoring must be carried out periodically to ensure that the concerned activities create no impacts in and around the siding area.

10.2.11 Implementation of Environmental Management

The protection of environment will be the responsibility of siding owners. Siding owner shall develop an environmental management unit. The task of the unit would be to supervise and co-ordinate implementation of environmental mitigation measures.

10.2.12 Education and Awareness Programs

Siding Owners must initiate the internal as well as external awareness programs involving all the stakeholders in controlling and enhancing the environment. This will include meetings, environmental forums on and off site to analyse dust generation events. Internal/External education and awareness for the management of pollution from siding activities shall help to improve operational proficiency in the handling of materials. Improved loading competency leads to reduce pollution.

Develop environmental awareness among operational and maintenance personnel associated with siding activities. Development of operator procedural training to implement revised and new unloading practices should be ensured to maintain the consistent work practices among all work personnel's involved in loading & unloading activities. An Environmental Awareness programme shall be implemented for all siding personnel to acquaint about the key environmental issues and potential impacts thereof. It will be ensured that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations within the siding area.

Environmental Awareness Plan should be such that, the goals setup by the management for pollution abetment be met. Management is responsible to formulate the procedure to carry out the pollution abatement program. Responsibility of management should be in strict compliance with the comprehensive training and programs. General environmental training is to ensure that employees and contractors[11] at each relevant function and level should receive environmental training and be aware of the environmental management initiatives undertaken during operations. Progress on compliance with the training program must be verified during the Management meetings. The various parameters for the training programs should include:

- Dust pollution Management
- Water management
- Waste management

[11] Contractor: Transportation Lorry owners, Tanker owners etc

- Spill management
- Complaint Management
- Incident reporting

CHAPTER – 11
CONTAINER SIDINGS

11.1 EXISTING OPERATION SYSTEM

11.1.1 Operating System

The containers are loaded & unloaded directly on rail board through mechanical means such as moving loading arms (Gantry Girders) and Cranes. The two container handling siding were visited. The list of Container siding visited is given in the **Table 11.1**.

As the goods are packed and enclosed in containers, the pollution due to loading and unloading of containers is not liable to create air pollution. The source of pollution is only due to haul roads.

11.1.1.1 Pollution due to Operating System

No pollution due to operating system was noticed. Only pollution possible was due to emission from machineries.

11.1.1.2 Haul Road

During field visits it was noticed that, the approach roads at siding were in bad condition. Approach roads for the sidings were found to be dustier and poorly maintained.

11.1.2 Treatment System

11.1.2.1 Haul Road

No system exists to control dust particles from haul roads.

11.1.2.2 Waste Water Collection System

No proper waste water collection and drainage system was observed at any siding.

11.1.2.3 Solid Waste Disposal System

No proper domestic solid waste collection and disposal facility was found at any siding.

TABLE 11.1: CONTAINER SIDINGS VISITED

Sl	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
1	Inland Container Depot, CONCOR, Sabaramati	WR	Container	Mechanical	500 lit/day	Yes	No	No	PM	--	
2	Container Siding, Fatuha	ECR	Containers of Iron & Steel (Wrought)	Mechanical	Not Available	No	No	No	--	--	

11.1.2.4 Vegetation

No vegetation cover was observed at any siding.

11.2 ENVIRONMENTAL MANAGEMENT PLAN FOR CONTAINER SIDING

An attempt has been made to prepare the management plan on the basis of observations, available data and discussion made during field studies. Some impacts which were not identified during field visit due to unseen and unreported activities were also included for completeness of Environmental Management.

11.2.1 Air Pollution Control

The sources of pollution are mostly from haul roads. The dust control plan for various activities at siding is as follows:

11.2.1.1 Haul Roads

The major source of dust generation is due to wheel contact with road during vehicular movement. The management plan for minimizing haul road dust generation is as follows:

- An unpaved roads should be paved at the existing sidings,
- Higher grading of main haul roads and service roads to clear accumulated loose material,
- Regular sprinkling of water on haul roads for dust suppression,
- Dust dislodgement from vehicular movement must be minimized by implementing speed limits,
- The trucks should be covered with the Tarpaulin,
- Truck body washing system before entering and outing from siding area
- Vehicular movement at the siding area, shall be regulated effectively to avoid traffic congestion and to protect the workers from dust due to exposure in dusty environment,
- Emissions from the heavy duty vehicles operating in and out of siding shall follow the standard under Motor Vehicles Rules 1989.
- Afforestation with dust filtering trees around railway siding area for control of dust.

Dust emission from the various activities at siding is in the form of Particulate Matter PM_{10} and $PM_{2.5}$. The permissible limit for these parameters is given in the National Ambient Air Quality Standards, CPCB. All the air pollution parameters at sidings should comply with this standard. The National Ambient Air Quality Standard is given in the Annexure 4.1.

11.2.2 Noise Pollution Control

Noise dispersion is based upon the distance it travels. The major noise generating machineries/equipments are within definite boundary of railway siding area. Hence, noise has insignificant impact on the surrounding area. The major noise activities at siding are loading and unloading of wagons, loader vehicle and trucks movement. However, due to some sidings which comes within city limits have some possibility of noise disturbance which can be protected through the following practices:

- Proper and timely maintenance of loading & unloading machineries,
- Provision of Green Belt for noise control,
- The operators and workers working in the high-noise areas shall be provided with ear-muffs/ear-plugs,
- The operator's cabins (control rooms) shall be properly (acoustically) insulated with special doors and observation windows,
- Acoustic laggings and silencers shall be provided in equipment wherever necessary,
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- If generators will be used it should ensure that these machine /equipment meet the desired noise/vibration standards by providing noise absorbing material in enclosures,
- Provision of wind dust wall also acts as noise barrier to some extent,
- Restricting speed and preventing idling of transport vehicles,
- Use of high pressure horns operating within the siding and surrounding area shall be avoided

The permissible limit for noise is given in the National Ambient Noise Quality Standards, CPCB. All the sidings/Goodsheds should comply with this standard. The National Ambient Noise Quality Standard is given in the Annexure 4.2.

11.2.3 Waste Water Environment

The most of the sidings do not have proper waste water collection and disposal systems. The waste water is now being collected or drained off by unchannelled way and in some places it is accumulated within siding area, in simple tank or to connection with nearby drains. The waste water should be re-used for plantation, road washing or sprinkling after providing proper treatment. To conserve the water, following practices should be adopted:

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- Provision of proper storm water management at the siding to ensure that pollutants and sediment are not carried into the nearby water bodies,
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- In cases where facilities are linked to existing sewerage system, all necessary regulatory requirements should be adhered to,
- In case waste water contains any harmful substance which is harmful to the environment, the same shall be treated to remove so as to meet the prescribed norms,
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11.2.4 Solid Waste & Hazardous Waste management

Solid Waste Management:

- The left over material during loading and unloading should have proper collection, reuse and disposal facility,
- All the solid wastes should be collected, segregated, transported and disposed at an authorized waste disposal facility,
- Temporarily storage facility should be designed in such a way that waste stored are not exposed to open atmosphere and are aesthetically acceptable,
- Storage bins should be painted green for biodegradable, blue for recyclable and red for non-biodegradable,
- Specific precautions must be taken to prevent refuse from being dumped on or in the vicinity of the siding,
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Soil erosion at siding site must be prevented by adopting proper measures at all times. Visual monitoring should be carried out through manual inspection and photographic records. Visual monitoring should be carried out by staff with good observational skills and the ability to collect the reliable data for record and report. It should identify the areas where immediate action is required. The soil erosion should be controlled by the following actions:

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The greenbelt development plan aims at overall improvement in the environmental conditions of the region. The green belt helps to capture the fugitive emissions and attenuate the noise generated at site along with improving the aesthetics of the area. Green vegetation cover is beneficial in many ways, such as retention of soil moisture, prevention of soil erosion, recharge of ground water and moderation of microclimate.

Keeping in view the climatic conditions and quality of soil, the types of species shall be selected for plantation around the siding and along the roads. In addition to above some flowering plants, shrubs, herbs, and climber species shall also be planted for

beautification of the siding area. Selected species should have faster growth, and helpful in soil and water conservation. A green belt of at least 15 meter width needs to be developed within siding peripheral area.

Greenbelt Development Plan: In order to capture the pollutants, a greenbelt along the periphery of siding area should be developed. General list of plants suggested for green belt development is presented in **Table 11.2** and plant species for noise prone area is presented in **Table 11.3**. The general plan for development of greenbelt is summarized below:

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- Turfing of grass (lawn) for effective trapping and absorption of air pollutants,

TABLE 11.2
PLANTS SUGGESTED FOR GREEN BELT DEVELOPMENT

Sr.No	Botanical Name	Common Name
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11.2.7 Up-gradation of Existing Facilities

The potential pollution needs to be mitigated or curtailed at the point of source. This includes changes in system and personnel involved in handling the works. The material handling facilities consists of old infrastructure which needs to be replaced. These aging infrastructures may not be able to pursue in reducing leakages. New facilities should be aiming to include current best practice in leakage minimization. New improved techniques should be adopted.

11.2.8 Land Use

Integrated transportation and land use planning is an essential requirement to achieve a truly efficient freight system. With continued urban expansion it is essential that Sidings and Good-sheds should be identified to be relocated outside of urban centres due to anticipated future growth and pollution hazards.

11.2.9 Public Complaints

Despite widespread pollution intensive activities and receipt of numerous complaints, siding owners need to frame comprehensive guidelines relating to handling and transportation of pollution intensive commodities. To address the community complaints on pollution due to freight traffic and siding operation are the responsibility of siding owners. Appropriate response to the community complaints is likely to reduce the number of both ongoing and new pollution related community issues. Siding owners should prepare specific guidelines for handling of community complaints and this should include:

- Clear and regular communication with community groups, councils, forums and individuals to discuss the issues,
- Recording and attending the complaints, coordinating the response and providing a solution,
- Information on pollution mitigation initiatives being undertaken,
- Improved relations with local communities, councils and forums that raise the social responsibility profile and provide opportunity to better focus solutions to root cause of community perception and concerns.

11.2.10 Environmental Monitoring

Environmental monitoring should be the major component of the environmental policy formulated for sidings.

- Environmental monitoring will be undertaken by the concern siding owner on periodic basis,
- This monitoring will be undertaken in order to ensure compliance with all aspects or requirements of the Environmental Measures.

- Undertake external audits.
- Visual monitoring must be carried out periodically to ensure that the concerned activities create no impacts in and around the siding area.

11.2.11 Implementation of Environmental Management

The protection of environment will be the responsibility of siding owners. Siding owner shall develop an environmental management unit. The task of the unit would be to supervise and co-ordinate implementation of environmental mitigation measures.

11.2.12 Education and Awareness Programs

Siding Owners must initiate the internal as well as external awareness programs involving all the stakeholders in controlling and enhancing the environment. This will include meetings, environmental forums on and off site to analyse dust generation events. Internal/External education and awareness for the management of pollution from siding activities shall help to improve operational proficiency in the handling of materials. Improved loading competency leads to reduce pollution.

Develop environmental awareness among operational and maintenance personnel associated with siding activities. Development of operator procedural training to implement revised and new unloading practices should be ensured to maintain the consistent work practices among all work personnel's involved in loading & unloading activities. An Environmental Awareness programme shall be implemented for all siding personnel to acquaint about the key environmental issues and potential impacts thereof. It will be ensured that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations within the siding area.

Environmental Awareness Plan should be such that, the goals setup by the management for pollution abetment be met. Management is responsible to formulate the procedure to carry out the pollution abatement program. Responsibility of management should be in strict compliance with the comprehensive training and programs. General environmental training is to ensure that employees and contractors[12] at each relevant function and level should receive environmental training and be aware of the environmental management initiatives undertaken during operations. Progress on compliance with the training program must be verified during the Management meetings. The various parameters for the training programs should include:

- Dust pollution Management
- Water management

[12] Contractor: Transportation Lorry owners, Tanker owners etc

- Waste management
- Spill management
- Complaint Management
- Incident reporting

CHAPTER-12
CONCLUSION AND CHALLENGES

12.1 CONCLUSION

IR carries nearly 970 MT of freight in a year. The major commodities handled by IR are Coal, Mineral, Cement, Food grains, Fertilizer, Industrial Materials, POL and Containers. Sidings provide facilities to loading, unloading and storing the commodities. The sidings are classified into four categories i.e. Private, Assisted, Railways and Military. The handling of material at sidings/Goodsheds creates nuisance due to pollution. No data is available on pollution at sidings. The aim of the study was to make inventory of the sidings and identification of sources of pollution at the selected visited sidings. The data regarding siding is not available at one place and hence, this data for all siding was collected from respective zones of IR.

Field studies were carried out at selected sidings to understand ground level details on the process of loading and unloading and problem associated with pollution. Problems have been identified majorly during the loading, unloading, storing process and at haul roads. The existing policies are not substantial to provided complete solution for the problems. An attempt has been made to assess identified sources & other issues related to the railway sidings & develop Commodity Specific Environment Management Plans so that the sidings sector caused minimal impact of the environment.. The conclusion of the study is presented in the following section.

12.1.1 Inventorization

An inventory was carried out by visiting all zones and divisions to identify the number of siding existing in each zone. The analysis of inventory done is given below:

- There are 859 number of sidings,
- Out of 859 sidings, 768 are private, 44 are assisted and 25 number each of Railway & Military.
- Northern Railway Zone has maximum number of sidings followed by South East Central Railway Zone.
- The major commodity handled at sidings/Goodsheds is Coal i.e. 36% followed by common commodity siding i.e. 17%.
- At 68% of sidings, the commodity loading and unloading is carried out by both Mechanized & Manual (M&M) arrangement,
- There are 503 number of Goodsheds,
- Majority of Goodsheds exists in Northern Railway Zone i.e. 101 Numbers followed by South Central railway Zone i.e. 55 numbers.
- Majority of commodity handled at Goodshed is of mixed type.

12.1.2 Field Observations

55 numbers of sidings were visited for field study. The sidings were selected based on the commodity handled like Coal, Minerals, Cement, POL, Food grains, Fertilizers, Engineering materials and common commodities. The field visit observations are presented in the following section.

COAL:

- 19 number of coal sidings/Goodsheds were visited, out of which 17 number have mechanized system while two have manual arrangement,
- Loading of coal is being carried out by silos through conveyor belt, loading arm and JCB. Unloading is being carried out through Tippling system,
- Intensity of dust pollution is varying and it depends on the process of loading, unloading, storing and transit of coal,
- Dust pollution is observed during lifting and lowering of coal to wagons and at stockpiles,
- Dust pollution is also observed at tippling system during lowering of coal unloading in conveyor belt,
- Haul roads are the major generator of dust,
- At large coal traffic handling sidings, sprinkling systems are in operation, however at small coal traffic water tankers are in use,
- Wind screen is observed only at Paradip Port Trust to restrict the dust spreading due to wind erosion from stockpile,
- Waste water collection, treatment and disposal system hardly exists at any siding, those having system, is in choked condition,
- No proper collection and disposal system observed for solid waste,
- Only 25% of siding is having plantation.

CEMENT:

- 7 number of cement handling siding were visited, all found operating through manual arrangement,
- Loose cement particles are the source of pollution,
- At some sidings Cement loading & unloading is done by direct transferring it to wagons. This generates less pollution than storing followed by loading,
- No protective equipments for workers,
- No proper waste water collection system,
- No proper collection and disposal system for solid waste,
- No vegetation cover except at one siding,

FOOD GRAINS:

- 5 number of food grain handling siding were visited and found operating manually,
- The loading/unloading activity is being carried out through head loads or change of head loads,
- The food grains bags are temporarily stored at designated storage place i.e. at godowns and in tin shed at platform,
- The source of pollution is leakage of grains,
- No air pollution noticed during handling operation,
- Most of the haul roads are unpaved, which are the only source of pollution,
- No proper collection and disposal system for solid waste except
- Leakage food-grains is being collected on tarpaulin through sweeping,
- No proper waste water collection system were observed,
- No vegetation cover observed except at one siding

FERTILIZER:

- 4 number of fertilizer handling siding visited and all are found operating through manual system,
- The loading/unloading activity is being carried out through head loads or change of head loads,
- At two locations storage is in closed godowns and two siding location the storage facility is found open,
- The source of pollution is leakage of fertilizer bags,
- No air pollution noticed during handling of fertilizer,
- The leaked fertilizer is collected at tarpaulin placed below the circulating area,
- Haul roads are the major source of dust pollution,
- No proper waste water collection system,
- No proper collection and disposal system observed for solid waste,
- Vegetation cover at 2 sidings and at one siding scattered vegetation observed.

POL:

- 6 number of POL handling siding are visited
- POL sidings is being operated through Gantry system,
- The wagons are loaded through hose pipe attached to the master valve of the wagon,
- No air pollution during operation,
- The point of source of pollution is leakage and varies up to 250 -500 liters per day,
- Waste water collection system with oil-water separator system exists at the sidings,

- No pollution due to haul roads as activity is carried out through pipeline and wagons,
- Scattered vegetation except green belt at one siding is observed,
- Fire fighting system exists at all the visited sidings.

MINERALS:

- 5 number of Mineral handling siding are visited, out of which 3 numbers of sidings is being operated by mechanical and one by manual arrangement,
- Loading is being carried out by silos through conveyor belt, JCB and manual system.
- Source of pollution is due to material handling, storage and due to haul roads,
- The air pollution impact is less as density of minerals are more than coal,
- The pollution is possible during heavy wind and due to faulty system,
- Haul roads are the major generator of dust,
- No proper waste water collection system,
- No proper collection and disposal system for solid waste,
- No vegetation at any of the siding visited.

INDUSTRIAL MATERIAL:

- 4 number of Industrial material handling siding are visited and found operated through mechanical means,
- The loading & unloading is carried out by moving loading arm (Gantry Girder) and cranes,
- No air pollution due to operating system,
- Only possible pollution is due to emission from machineries,
- Haul roads are found dustier and poorly maintained is the only major source of pollution,
- No proper waste water collection system were observed,
- Oil waste from the machineries left over the ground and no disposal facility found,
- No proper collection and disposal system for solid waste,
- No vegetation at any of the siding visited.

COMMON MATERIAL:

- 6 number of common material (except POL) handling siding are visited and all are operating by manual arrangement,
- Common materials are food grains, fertilizer, onion, sugar, edible oil etc,
- The loading/unloading activity is being carried out through head loads or change of head loads,
- No air pollution due to operating system as materials are in packaged form,
- Haul roads are the major generator of dust pollution
- The leaked material is recollected and packed again,

- No proper waste water collection system except at one siding,
- No proper collection and disposal system for solid waste,
- No vegetation at any of the siding visited.

CONTAINER:

- 2 number of container handling siding are visited,
- Loading and unloading is being carriedout by Cranes,
- No air pollution due to operating system as containers are directly loaded and unloaded to wagons,
- The source of pollution is only due to haul roads
- No proper waste water collection system except at one siding,
- No proper collection and disposal system for solid waste,
- No vegetation at any of the siding visited.

12.2 CHALLENGES

Statutory Regulations

Railway administration is responsible for their sidings and Goodsheds. IR is not responsible for Goods to be loaded or delivered at a siding not belonging to Railway Administration[13]. The responsibility of Railway Administration is limited to providing services of rolling stock only. Also, railway administration is not responsible for improper loading or unloading by the consigner or consignee[14]. The owner of siding is responsible for operation and maintainance of siding within its jurisdiction. Hence, environmental management at sidings is not sole responsibility of railway administration but the owner of sidings.

The compliance with the provision of various statutory regulations helps in assuring protection and control of pollution w.r.t Air, noise and water pollution. The environmental management in India is governed by various laws/rules/regulations. These acts and rules are given in the **Table 12.1**.

TABLE 12.1
APPLICABLE ACTS AND RULES

Sl	Statutory Regulation	Particulars Applicable
1	Air (Prevention and Control of Pollution) Act,1981	As per Section 21 “no person shall, without the previous consent of the State Board, establish or operate any industrial plant in an air pollution control area”
2	Water (Prevention and Control of Pollution) Act,1974	As per Section 24,25,26 “ no person shall knowingly cause or permit flow of any poisonous, noxious or polluting matter into any stream or well or sewer or

[13] Section 94 of the Railway Act, 1989
[14] Section 102 of the Railway Act, 1989

		land without treating it”
3	The Hazardous Wastes (Management and Handling) Rules, 1989.	As per Rule 5 “ every occupier handling hazardous waste shall make an application for grant of authorization for handling hazardous waste”

- Consent for Operation (CFO) from the concerned SPCB should be taken as applicable as per the section 21[17] of the Air (Prevention & Control of Pollution) Act, 1981.
- Effective monitoring system to be put in place for ensuring compliance with the statutory regulations,
- Extensive tree plantation should be undertaken on all roads - sides and open spaces as they serve as a sink for the pollutants like SO_2, and PM,
- In order to mitigate the air pollution from transportation of materials on roads, periodic maintainance of roads and vehicles including trucks should be ensured by concerned department.

CHAPTER-13
RECOMMENDATIONS

13.1 RECOMMENDATIONS

Based on the observations and discussion during the study, the following recommendations have been made that will be helpful in planning and management of Railway Sidings in India.

COAL & MINERAL SIDING

It is noticed during study that dust nuisance at coal, mineral and cement handling siding is much more as compared to rest of the commodities. Hence the sidings involving these commodities needs more protective measure to minimize the generation of dust pollution from various activities involved at sidings.

- Sidings should be kept away from the residential area, school/colleges, Historical Monuments, Religious Places, Ecological sensitive area as well as forests area.

- The sidings should have mechanized loading/ unloading from rolling stock,

- The drop heights should be minimized to reduce dust during loading and unloading operations,

- The stockpile should have adequate dimensions so that wind erosion from the stockpile will be minimum. The loading /unloading at stockpile should be done by mechanized means.

- Sidings shall have paved approach roads with adequate traffic carrying capacity. The existing haul roads which are in bad condition should be repaired and maintained.

- The roads should have proper camber to avoid the water logging on the roads,

- The siding shall ensure regular sweeping of dust from internal road and it should be ensured that there is adequate space for free movement of vehicles.
- The heavy loading and unloading taffic siding should have dust screen walls all along periphery of the premises with adequate height.

- Water sprinkling system should be in practice along the haul roads either mechanized system or through water tankers,

- Continuous water sprinkling shall be carried out for stockpile at regular intervals to prevent dusting. Water sprinkling shall be carried out at each and every stage of coal handling to avoid generation of dust within premises.

- The sidings need to be provided with thick rows plantation having tall growing tress all along the periphery, inside & outside of the premises and along the road.

- Proper waste water/drainage system shall be provided at sprinkling area of loading, unloading and at storage so that water drained is collected at a common tank and can be reused.

POL SIDING

- All components of POL siding/ depot should be designed and maintained as per OISD standards,

- Proper connection of the filling hose or loading arm to the wagon to avoid leakages,

- The loading / unloading operation shall be carried out under close supervision of authorized person,

- Loading gantry area including areas below railway tracks shall be paved for smooth draining and collection of spillages into drains,

- A network of drainage system shall be provided along the rail track to collect oil drained from various equipments at gantry areas, pump houses etc. They should also collect surface drains from places where oil spillages are likely to occur. The drainage shall lead to OWS / ETP as per the case,

- The receiving sump of the OWS shall have suitable arrangement for skimming off.

- Open drains along the railway line/gantry shall be covered with gratings so as not to endanger movement of personnel,

- Main railway track shall be isolated from wagon gantry siding,
- Loading & unloading Pumps shall be located in the paved area with drainage facilities routed to OWS / ETP,

- Loading points shall have quick shut-off valves to avoid the leakage,

- Roads should be provided to serve all areas requiring access for the operation, maintenance and fire fighting,

OTHER SIDINGS:

It has been identified during study that, the major dust pollution is generated through haul roads at Food grain, Fertilizer, Common material handling sidings. Haul roads at almost sidings of this category are in bad condition and need immediate repair.

- Sidings should have paved approach roads,
- Water sprinkling system through mechanized system or tankers should be provided as per requirement,
- These siding shall ensure regular sweeping of dust from road and also ensure that there is adequate space for free movement of vehicles,
- Proper godowns should be provided for storage of commodities,
- Loading and unloading of packed materials should be carried out by counterbalance trucks/warehouse trucks to avoid leakage due to manual handling specially during lifting of bags by iron hooks,
- The leaked materials should be collected properly,
- Proper waste water/drainage system shall be provided at sidings/Goodsheds
- The waste water should be collected at a common tank and can be reused after screening or providing effective treatment,
- The siding area should have thick green belt cover to control the air and noise pollution.

BEST PRACTICE:

Use of best available techniques for handling materials can reduce dust pollution significantly. Regular maintenance of handling equipments also plays an important role in pollution abatement. The optimum use of resources may also reduce the waste generation.

- Loading of coal and minerals should be carried out by Silos or Batch Weighing Systems,
- Unloading of coal should be carried out through mechanized way (tippling system),
- Mechanized water Sprinkling system all along the haul roads,
- Mechanized water Sprinkling system for stockpiles,

- Fogging system to remove dust from air is the most proven and cost effective technique,

- Use of Chemical Suppressant as per site specific for optimum use of sprinkling water,

- Wind screen wall surrounding the coal handling siding will be the best option for dust control due to wind erosion,

- Commodities like food grains, fertilizers and other packed materials should be stored in closed godowns,

- Adoption of counterbalance trucks/warehouse trucks at sidings other than coal & POL can avoid leakage,

- Proper waste water/drainage network should be provided at all sidings.

- Use direct transfer of commodities to wagons from trucks without unloading at siding wherever feasible.

13.2 FURTHER STUDY

The present study addresses inventory of railway sidings and collection of data pertaining to existing operation system. The data related to pollution were collected by observation and consultation from selected sidings. Pollution intensive commodities like Coal, Minerals and other loose material handling represent a potentially significant area of study, since it has not been studied in detail in India. There is no data available with respect to air, water, ecology for sidings. The responsibility of various stakeholders should be identified. A detailed investigation is required to generate the environmental baseline data for each type of sidings. This will help in addressing the specific mitigation measures for each type of sidings. The guidelines/rules/standards would be prepared after the detailed investigation and measurement pertaining to land, air, water and biological impacts.

Guidelines of SPCB

GUIDELINES FOR MINERAL STACK YARDS AND RAILWAY SIDINGS

APRIL, 2008

STATE POLLUTION CONTROL BOARD, ORISSA

Paribesh Bhawan, A/118, Nilakanthanagar,Unit-VIII,
Bhubaneswar – 751 012, INDIA

GUIDELINES FOR PROCESSING OF CONSENT APPLICATION FOR MINERAL STACK YARDS AND RAILWAY SIDING

Transportation, storage, loading and unloading of minerals at Stack yard / Railway sidings has considerable air pollution potential. These activities have been brought under consent administration of the Board as **RED category** as per **Board's Resolution No. 3369 dt. 16.2.08**. Application for grant of consent to these activities are to be disposed of by concerned Regional Offices as per the **delegation of power vide letter No. 2186 dt. 31.1.08**. In order to facilitate timely disposal of application and make the procedure uniform, the following guidelines are issued.

1. **DEFINITION**:

   i) **Stack yard** : Stack yard means mineral stack yard over an area, which is used to receive, store either for a short period or long period and dispatch minerals from the site and require a trading license from competent authority.

   ii) **Railway siding** : A railway siding is a place/ area which is used to receive, temporarily store and load / unload material in the rakes and dispatch materials.

2. **APPLICABILITY** :

   i) The railway sidings and stack yard of minerals which are already established and operating **prior to the date of Board's Resolution i.e 16.2.08** are required to only obtain consent to operate from the Board.

   ii) Railway sidings and stack yards which are established **after the date of Board's Resolution i.e 16.2.08** or to be established thereafter are required to obtain consent to establish first and then consent to operate from the Board.

   iii) Mineral stack yard or railway siding located inside the premises of industry / mines which are already covered under consent administration will not require separate consent.

   iv) The consent granted under the provision of section 25 of Water (Prevention & Control of Pollution) Act. 1974 and section 21 of Air(Prevention & Control of Pollution) Act. 1981 shall be subject to Trade License issued under Orissa Mineral (Prevention of Theft, Smuggling and

Illegal Mining and Regulation of Possession, Storage, Trading and Transportation) Rules 2007.

3. APPLICATION FORM :

The applicant shall apply for consent to establish and consent to operate (as applicable) in the prescribed form of the Board. However, they have to submit additional information in the prescribed format as per **Annexure-I**. This format is to be provided to the applicant alongwith the consent application form.

4. SITING CONSIDERATIONS :

While considering application for consent to establish, site evaluation will be based on the following :

i) The proposed site is to be located away from habitation and State/National Highway at a safe distance.

ii) The proposed site is to be located atleast **1 km away from** Schools, Colleges, Hospitals, Archeological monuments, market place and other sensitive areas.

iii) Nearest water body should be at a safe distance.

iv) Location of the stack yard should be such that there is no public inconvenience for parking or movement of vehicles.

v) The applicant for consent to establish should obtain a NOC from Sarpanch following a gram sabha if it is proposed in a rural area or obtain NOC from the concerned ULB in case of urban area.

5. ENVIRONMENTAL ASSESSMENT :

a) Check list of Environmental Issues :

The following issues shall be taken into consideration for environmental assessment.

i) Siting of facility and proximity of nearby dwellings
ii) Compatibility of land use in the vicinity of the site
iii) Need for isolating the operational areas
iv) Likelihood that the materials stored will create dust nuisance
v) Dust management measures
vi) Off-site management strategies
vii) Storm water management system
viii) Appropriate storage of materials in bunded areas
ix) Impact of working out of normal office hours on nearby residents.

b) **Standard conditions** :

The following conditions may be imposed for pollution control while granting consent to establish / consent to operate. These conditions are only indicative and not exhaustive.

House Keeping :

1. All entry point, internal roads and loading/unloading areas must be made road worthy for movement of heavy vehicles by using low permeability material (e.g. concrete or bitumen) and be cleaned regularly to minimise potential for dust generation and off-site impact.
2. A boundary wall of atleast **3 meter** height shall be constructed along the periphery of the mineral stackyard to prevent the fine particles from being carried away with surface run off to nearby water bodies.
3. The height of material within storage areas must be kept below the height of the boundary wall at all times to prevent the material getting air borne.
4. All mineral storage areas containing fine or dusty materials must be either:
   - covered with tarpaulins when not in use, or
   - fitted with Automatic Water Sprinkling / Dry fog systems.
5. Green belt of atleast 15 m. width shall be developed immediately all around the perimeter of material storage and loading areas which are located in close proximity to villages and residential areas.
6. Planting of trees all along the connecting road and regular grading of such road shall be carried out to prevent generation of dust due to movement of dumpers/trucks.
7. Absolute care shall be taken to prevent creation of ruts and pot holes in the haul roads.
8. Proper house keeping at the material storage areas, loading & dispatch areas, service facilities, etc., shall be practiced.

Air Pollution Control :

9. Sprinkler systems must be maintained in an operable condition at all times.

10. Dust suppression arrangement shall be provided on approach road by using water sprinklers / mobile water tanker.

11. Wheel wash facilities are to be provided to minimize mud and dust track-out from unpaved approach roads to main paved and/or public roads.

12. At the material storage areas, atomized stationery mist spray of water or conditioning of material with water shall be practiced to prevent the dust getting air borne.

13. Appropriate transfer chutes shall be provided at material discharge points at material storage area, loading points etc., to minimize the discharge height and spread of air borne dust.

14. Appropriate preventive measures shall be taken for control of fire hazards at the stackyard / railway siding handling coal.

15. The operator's cabin in the dumpers and trucks shall be provided with dust proof enclosure and the persons working at high dust prone areas shall be provided with dust mask.

16. Smoke emission from heavy duty vehicle operating in the stack yard / railway siding shall conform to the standards prescribed under the Motor Vehicle Rules, 1989.

17. Use of high pressure horns in the heavy duty vehicles operating in the mineral stack yard / railway siding shall be avoided.

18. Noise level should remain within the ambient noise standard.

19. Ambient Air Quality inside the premises shall conform to the National Ambient Air Quality Standard prescribed for industrial and mixed used area under EP Act, 1986.

Water Pollution Control :

20. Domestic effluent shall be discharged to soak pit through septic tank constructed as per BIS specification.

21. A garland drain is to be provided along the boundary wall inside the mineral stack yard. Provision shall be made for collection of wash water from the garland drain and water, so collected shall be treated in a sedimentation tank for further use inside the premises for green belt or water sprinkling etc. Under no circumstances, the wash water shall be allowed to go outside the premises.

22. In case the waste water contains any substance which is harmful to the environment, the same shall be treated to remove the substance so as to meet the prescribed norms.

Good Operating Practice :

23. Speed limit of dumpers/trucks used for loading / unloading of materials shall not exceed **10 kmph.** Overloading of vehicles shall be avoided.

24. Occupiers of the stack yard / Railway siding shall ensure that vehicles used have valid **"Pollution Under Control (PUC)" certificate**.

25. During transportation of material by trucks / tippers / wagons through public roads, the vehicles shall be properly covered with tarpaulin sheets and shall ply in safe speed. The trucks/tippers shall have sufficient free board. Spillage of material on public roads shall be cleared immediately on occurrence.

26. **All the materials (more than one) at the stackyard /railway siding shall be stored within a bunded compound or area without inter mixing each other**.

27. Provisions of the E(P) Act, 1986 and the relevant rules framed thereunder, shall be applicable where necessary.

The Regional Officers may stipulate additional conditions, if they feel so, after assessing ground reality and local conditions.

c) **Annual Return** :

Every operating mineral stack yards and Railway sidings shall submit an annual return to concerned Regional Office in the prescribed format as per **Annexure – II** by **31st May every year** incorporating the quantities of material handled during the preceding financial year **(i.e. 1st April to 31st March)**.

ANNEXURE – I

STATE POLLUTION CONTROL BOARD, ORISSA

Paribesh Bhawan, A/118, Nilakanthanagar,Unit-VIII,
Bhubaneswar – 751 012, INDIA

ADDITIONAL INFORMATION

A. Mineral Stack Yard ☐ B. Railway Siding ☐

1. **GENERAL INFORMATION :**

1.1 **Name of the applicant :**

1.2 Mailing Address **:**

e-mail **:**

Telephone No. **:**

Fax **:**

1.3 Does the activity relate to :

1.3.1 New	Yes	☐	No.	☐
1.3.2 Expansion	Yes	☐	No.	☐
1.3.3 Existing	Yes	☐	No.	☐

2. **SITE DETAILS :**

2.1 Area of Mineral Stack Yard /Railway Siding in _____Sq.m/Sq.ft/Acre.

✓ Encl : Patta and/or other relevant land document if any.

2.2 Site Address

Village	Tehsil	District

✓ Enclose a site map

2.3 Name of the person/ company **:**

(owner of the company)

2.4 Distance from the following features (1km.)

Features	Distance	Details
Human settlement / villages		
Schools / Colleges		
Market Places		
Temples & Hospitals		
Rivers / Streams / Ponds		
Others		

- ✓ *Indicate these feature in the site map* :

2.5 Distance of approach road from nearest Highway (NH/SH) / Railway connectivity / port :

2.6 Category of approach road to be used for transportation :

3. **ACTIVITY DETAILS :**

3.1 Type of material that would be handled :

Sl. No.	Type of material	Qty. per year.	Maximum storage quantity at any point of time
1.			
2.			
3.			
4.			

3.2 Mode of transport :

Incoming mode	:	By truck
	:	By rake, By tractor
Outgoing mode	:	By truck
	:	By rake, By tractor
	:	Any other means.

3.3 Manner of loading / unloading :

3.3.1 Manual Loading :

- ✓ Maximum daily receipt of material :
- ✓ Maximum daily dispatch of material :
- ✓ Nos of people to be engaged for loading/unloading :

3.3.2 Mechanized loading / unloading :

Type of machines	**Nos.**	**Capacity**
Loader, Dumper		
Stacker reclaimer		

4. **ENVIRONMENTAL MANAGEMENT PLAN :**

Sl. No.	Environmental issues *	Already practiced if applicable	Proposed
01.	Air pollution (fugitive dust emission)		
02.	Water Pollution (Run off Water Management)		
03.	Noise Pollution		
04.	Plantation		
05.	Others		

[* As applicable]

CHECK LIST FOR ADDITIONAL DOCUMENTS

1.	Site map indicating all features.
2.	Patta and other relevant land documents if any in support of proof of ownership.
3.	Permission from DDM
4.	Permission from Railway authority for railway siding.

Verification : **The data and information given in this proforma are true to the best of my knowledge and belief.**

Date : **Signature of Applicant***

With full name & address

Place :

[* ***Owner or his authorized signatory*****]**

Given under the seal of organization

onbehalf of whom the applicant is signing

ANNEXURE – II

ANNUAL RETURN

Name of the unit :

Address :

Telephone No :

E-mail :

Consent order No.: Consent valid upto:

Annual Return for the year ending 31st March :

Months	Type of material *	Opening stock (MT)	Receipt	Dispatch	Closing stock	Remark
April						
May						
June						
July						
August						
September						
October						
November						
December						
January						
February						
March						

* Attach separate sheet for additional material.

Certified that the above return is for the period from ……. ……

Date :

SIGNATURE*……

Place :

DESIGNATION…….

[* Owner or his authorized signatory]

झारखण्ड
JSPCB

झारखण्ड राज्य प्रदूषण नियंत्रण पर्षद

नगर प्रशासन भवन, एच.ई.सी., धुर्वा, राँची
दूरभाष : 2400852, 2400851, फैक्स : 0651-2400850

अधिसूचना

अधि. संख्या :- B-8

राँची, दिनांक :- 22.5.13

पर्षद मंडल की 22 वीं बैठक दिनांक 19.04.2011 के पुजेण्डा संख्या - 8 लिये गये निर्णय के आलोक में पर्षद अधिसूचना संख्या - 4, दिनांक 03.05.2011 के द्वारा Mineral stock yard/Loading -Unloading/Stroage facility के स्थापना हेतु साईड खाईन निर्धारित किया गया था जिसमें वन/वन भूमि तथा रेलवे लाईन से न्यूनतम दूरी वर्णित नहीं थी।

NOC Expert Commettee बैठक दिनांक 09.01.2013(ज्ञापांक - पी 134, दिनांक 09.01.2013) में dumping other than slag के स्थापना के लिये वन तथा रेलवे लाईन की न्यूनतम दूरी निर्धारित की गयी एवं उसे पर्षद मंडल की 26 वी बैठक दिनांक 06.04.2013 के पुजेण्डा संख्या - 6 में अनुमोदित किया।

अतः पर्षद मंडल की 26 वी बैठक दिनांक 26.04.2013 के पुजेण्डा, संख्या - 6 में लिये गये निर्णय के आलोक मे Mineral stock, yard/Loading - Unloading/Storage facility other than slag का संशोधित NOC Guide Line निम्नरूप से निर्धारित किया जाता है :-

Sl.No	Minimum Distance From	Distance
1.	NH/SH	100 mtr
2.	School/College/Hospital/Archeological monuments	500 mtr
3.	Rivers/Lake/Pond	100 mtr
4.	Habitation	Nil within 100 mtr
5.	Forest	200 mtr
6.	Railway Line	50 mtr

(संजय कुमार सिन्हा)
सदस्य सचिव

ज्ञापांक : B-3444

राँची, दिनांक : 22/5/13

प्रतिलिपि - सभी उपायुक्त/सभी वन प्रमंडल पदाधिकारी/सभी जिला खनन पदाधिकारी को सूचनार्थ एवं आवश्यक कार्रवाही हेतु प्रेषित।

(संजय कुमार सिन्हा)
सदस्य सचिव

ज्ञापांक : B-3444

राँची, दिनांक : 22/5/13

प्रतिलिपि - सभी पदाधिकारी (मुख्यालय)/सभी क्षेत्रीय पदाधिकारी/पर्षद विश्लेषक एवं सभी पदाधिकारियों/कर्मचारियों (मुख्यालय) को सूचनार्थ एवं आवश्यक कार्रवाही हेतु प्रेषित।

(संजय कुमार सिन्हा)
सदस्य सचिव

Official Letter (Page 78

झारखण्ड राज्य प्रदूषण नियंत्रण पर्षद

नगर प्रशासन भवन, एच0ई0सी0, धुर्वा, राँची।
दूरभाष : 2400852, 2400851, फैक्स : 0651– 2400850

अधि0 संख्या :– 05

राँची, दिनांकः– 4/5/11

अधिसूचना

पर्षद मंडल की 22 वीं बैठक दिनांक 19.4.2011 के कार्यावली सं0–7 में लिए गए निर्णय के आलोक में रेलवे साईडिंग जहाँ पर रेलवे का स्वामित्व है के एन0ओ0सी0/सहमति के लिए आवेदन पत्र, रेलवे द्वारा जमा करने पर हीं पर्षद में स्वीकार किये जायेंगे। पर्षद द्वारा रेलवे साइडिंग का एन0ओ0सी0/सहमति आदेश रेलवे को निर्गत किया जायेगा।

किसी वाहय एजेंसी को रेलवे साइडिंग के लिए एन0ओ0सी0/सहमति आवेदन पत्र पर्षद में स्वीकार एवं प्रदान नहीं किए जायेंगे।

पर्षद, प्रदूषण नियंत्रण हेतु रेलवे को आवश्यक दिशा निर्देश देगी– एवं इसके अनुपालन का दायित्व ,रेल विभाग की होगी।

यह अधिसूचना निर्गत तिथि से प्रभावी रहेगा।

ह0/–
(संजय कुमार सिन्हा)
सदस्य सचिव।

ज्ञापांकः–
राँची, दिनांकः–

प्रतिलिपिः– पर्षद मुख्यालय के सभी संबंधित पदाधिकारी/कर्मचारी/सभी क्षेत्रीय पदाधिकारी को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित। सूचनापट पट पर प्रकाशनार्थ।

ह0/–
(संजय कुमार सिन्हा)
सदस्य सचिव।

ज्ञापांकः– 1133
राँची, दिनांकः– 4/5/11

प्रतिलिपिः– प्रमण्डलीय रेल प्रबंधक, चक्रधरपुर/आदरा/धनबाद/राँची को सूचनार्थ एवं आवश्यक कार्रवाई हेतु प्रेषित। अपने परिसर में अवस्थित सभी रेलवे साईडिंग के लिए पर्षद से एन0ओ0सी0/सहमति प्राप्त करने की कार्रवाई की जाए। पर्षद की अनुमति के बगैर रेलवे साइडिंग में लोडिंग/अनलोडिंग का कार्य सम्पादित नहीं किया जाए।

ह0/–
(संजय कुमार सिन्हा)
सदस्य सचिव।

ज्ञापांकः– 1133
राँची, दिनांकः– 4/5/11

प्रतिलिपिः– वेबसाईट को सूचनार्थ प्रेषित।

(संजय कुमार सिन्हा)
सदस्य सचिव।

ANNEXURE 2.1

CONSENT LETTER (RAILWAY BOARD)

भारत सरकार GOVERNMENT OF INDIA
रेल मंत्रालय MINISTRY OF RAILWAYS
(रेलवे बोर्ड RAILWAY BOARD)

No. 2012/TC(FM)/18/8. Rail Bhavan, New Delhi – 110 001, dated 20th May, 2012

General Managers (Commercial),

1. Central Railway, Mumbai (CSTM).
2. Eastern Railway, Kolkata.
3. East Central Railway, Hazipur.
4. East Coast Railway, Bhubaneswar
5. Northern Railway, New Delhi.
6. North Central Railway, Allahabad.
7. North Eastern Railway, Gorakhpur.
8. Northeast Frontier Railway, Maligaon.
9. North Western Railway, Jaipur.
10. Southern Railway, Chennai.
11. South Central Rly., Secunderabad.
12. South Eastern Railway, Kolkata.
13. South East Central Rly, Bilaspur.
14. South Western Railway, Hubli.
15. Western Railway, Mumbai (Chrchgate).
16. West Central Railway, Jabalpur.

Sub: Railway Sidings/ Goods sheds – Environmental issues.

The Cetral Pollution Control Board (CPCB) over the decades has been developing industry specific pollution control standards to protect the recipient environment. Keeping in view the quantum of loading and unloading activities at railway sidings across the country, CPCB has currently taken up a project on "Inventorization of Railway Sidings and development of guidelines for their Environment Management". The aforesaid study aims at inventorization of Railway Sidings and development of guidelines for their Environment Management. This study has been awarded to RITES. For the execution of the present study RITES is required to prepare an inventory of all major railway Goods sheds, Sidings, Yards, Ports etc. across the country.

In this connection, please extend co-operation to RITES as and when they approach your office for collecting information.

(Suhas Kumar)
Adviser Freight Marketing

Copy to –

Dy. GM (Urban Engg. Dept.), RITES Ltd., RITES Bhawan, 1, Sector-29, Gurgaon - 122001.

ANNEXURE 2.2

EXCEL SHEET FORMAT

ANNEXURE 2.2

SIDING DETAILS ZONEWISE

S. No	Terminal Code	Name of Terminal	District	Serving Station		Division	Zone	Commodities Handle	Outward (Tones)	Inward (Tones)	Type of Terminal	Commodity Group	Handling Mode
				Code	Name								

GOOD SHED DETAILS ZONEWISE

S. No	Terminal Code	Name of Terminal	District	Serving Station		Division	Zone	Commodities Handle	Outward (Tones)	Inward (Tones)	Type of Terminal	Commodity Group	Handling Mode
				Code	Name								

ANNEXURE 2.3

QUESTIONNAIRE FORMAT

CENTRAL POLLUTION CONTROL BOARD

RITES
MINISTRY OF RAILWAY

Questioner Form

Date:

Name & Address of the Railway Siding/Goods Shed/Yard/Ports:

Zone/ Division:

Name of Contact Person: Designation:

Contact Number: Fax: E-mail ID:

Classification of Siding/Goods Shed/Yard/Ports:

Approximate Area of Right of Way:

Any PIL or Court Case if any:

Siding/Goods Shed/Yard/Ports Details:

S No	Commodities	Annual Quantity (in MT) 2010-2011	Service Station	Local Logistic (Mode of Transportation of Commodity)	Handling Arrangement/ Mode	Total Number of Employees Engaged for Siding Activities	Remarks, If any
1							
2							
3							
4							
5.							
6.							

Page 1 of 2

CENTRAL POLLUTION CONTROL BOARD

MINISTRY OF RAILWAY

S No	Commodities	Annual Quantity (in MT) 2010-2011	Service Station	Local Logistic (Mode of Transportation of Commodity)	Handling Arrangement/ Mode	Total Number of Employees Engaged for Siding Activities	Remarks, If any
7.							
8.							
9.							
10.							

Additional Information:

1. Storage Facility at Railway Siding: Close ☐ Open ☐
2. Water Requirement (Liters/Day): Purpose:
3. Pollution
   - i) Solid Waste Generated in Handling Process(Kg/Day) :
   - ii) POL Waste if any(Kg/Day):
   - iii) Dust :
   - iv) Any Other:

   Pollution Test Report if available (Enclose)
4. Pollution Safety Measures if any:
   - i) Air Pollution: Dust Suppression/water sprinkler/Others
   - ii) Solid waste: In site treatment /Municipal landfill/burning/Others
   - iii) POL Waste: Oil & Grease Trap /Others
   - iv) Plantation of Trees/Green Belt, if any:
   - v) Any Other Measures

Annexure-3.2

List of siding visited

Sl	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
1	Panipat Thermal Power Plant, Panipat	NR	Coal	Tippling		Yes	No	No	PM	SS	• Dust Suppression, water sprinkle • Underground water tank • 50 trees
2	Mathura refinery Siding, Mathura	NCR	POL, Bitumen	Gantry, Manual	2000 lit/day	Yes	No	No	PM	O& G	• Waste POL collected at Pit Drain & Recycled • Green Belt
3	Ennore Port Limited, Chennai	SR	Iron Ore	Mechanical	8000 lit/day	Yes	No	No	PM	SS	• Water Sprinkler
4	FCI Grain Godown siding, Tirchy	SR	Food Grain	Manual	200 lit/day	No	Yes	No	PM	SS	• Left over collected by slum dwellers/villagers
5	Rangiyagarh siding, Paradip	ECOR	Fertilizer	Manual		No	Yes	No	PM	SS	• Green Belt
6	Dhanmandal	ECOR	Sponge iron, Cement, Fertilizer, Salt	Manual		Yes	No	No	PM	SS	
7	Kapilas Road	ECOR	Steel	Crane		No	No	No	--	--	
8	Paradip Port Trust	ECOR	Coal	Conveyer Belt loader	5000 lit/day	Yes	No	No	PM	SS	• Coal Heap covered by plastic sheets • High rise nets used at boundary wall for dust control
9	IMFA (Indian Metals & Ferro Alloys Ltd)	ECOR	Coal	Conveyer Belt		Yes	No	No	PM	SS	• Dust Suppression • Tree Plantation
10	Kaipadar Road	ECOR	Sleepers (Pre-stressed)	Gantry Girder	500 lit/day	No	No	No	--	--	
11	Gopalpur ports Ltd	ECOR	Ilemenite	Manual		No	No	No	PM	SS	
12	M/s Madras Cement Ltd, Jaggayapet Town	SCR	Gypsum, Coal, Cement, Clinker	Mechanical	5000 lit/day	Yes	No	No	PM	SS	• Water Sprinkler
13	Associated Cement Co. Secundarabad	SCR	Coal, Cement	Conveyer Belt,	1000 lit/day	Yes	No	No	PM	SS	• Scattered plantation

Sl	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
				Manual							
14	Sri Nand Kumar & Sons, Bibinagar, Secundarabad	SCR	Coal, POL, Foodgrains	Mechanical Mechanical Manual	500 lit/day	Yes	No	No	PM	SS	
15	NTPC Ltd, Ramagundam	SCR	Coal, POL	Conveyer Belt	5000 lit/day				--	SS, O&G	• Water Sprinkler
16	Godavari Khan No.6, Ramagundam	SCR	Coal	Conveyer Belt	1500 lit/day	Yes	Yes	No	PM	SS	
17	Kankaria	WR	Coal	Manual	250 lit/day	Yes	Yes	No	PM	SS	
18	Gujarat Refinary Siding, Vadodara	WR	POL	Gantry	5000 lit/day	No	No	Yes	--	O&G	• Waste POL collected at Pit Drain & Recycled
19	Gujarat State Fertilizer Ltd, Vadodara	WR	Fertilizer, Ammonia	Manual	1000 lit/day	No	Yes	No	--	--	• Used in own Nursery as manure
20	Electric Power House Siding, Sabarmati, Ahmadabad	WR	Coal	Mechanical	2500 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkler
21	Hindustan Salt Ltd, Viramjam, Gujarat	WR	Industrial Material, Salt	Manual, JCB	200 lit/day	Yes	No	No	PM	SS	
22	Inland Container Depot, CONCOR, Sabaramati	WR	Container	Mechanical	500 lit/day	Yes	No	No	PM	--	
23	IFFCO Siding	WR	Fertilizer, Urea/Ammonia	Manual	200 lit/day	No	Yes	No	--	SS	
24	NFST Siding	WR	HSD/Naptta	Gantry	1000 lit/day	No	No	Yes	--	SS, O&G	• POL drain through channel & reuse • Green Belt
25	Sabarmati Goodshed, Ahmadabad	WR	Foodgrains, All Commodities except POL	Manual		Yes	Yes	No	PM	SS	
26	Kharaghoda Goodshed	WR	Salt	JCB		Yes	No	No	PM	SS	
27	MSPL-AHB	SWR	Iron Ore	Conveyer Belt	5000 lit/day	Yes	Yes	No	PM	SS	
28	Formento	SWR	Iron Ore	Silo	10000 lit/day	Yes	Yes	No	PM	SS	
29	Shrirampur, kalkatta	SW	Fertilizer,	Manual		No	No	No	--	SS	

Sl	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
			Vegetable oil								
30	Dankuni, kalkatta	SW	Edible oil, Stone, Coal tar, onion, Cement, Sugar, Maze, Wheat, Spunj Iron, Pig Iron, Jipsum	Manual		No	Yes	No	--	SS	
31	Shalimar (Terminal yard)	SE	Iron, Cement	Crane, Manual		Yes	Yes	No	PM	SS	
32	Dhanbad	ECR	Coal	Mechanical	2000 lit/day	Yes	Yes	No	PM	SS	
33	Goodshed, Buxar	ECR	All Commodities except POL	Manual	100 lit/day	Yes	Yes	No	PM	SS	
34	Goodshed	ECR	All Commodities except POL	Manual	150 lit/day	Yes	Yes	No	PM	SS	
35	FCI siding, Mokama, Patna	ECR	All Commodities except POL	Manual	100 lit/day	Yes	Yes	No	PM	SS	
36	Container Siding, Fatuha	ECR	Containers of Iron & Steel (Wrought)	Mechanical		No	No	No	--	--	
37	POL Siding, Dhanbad	ECR	POL	Mechanical	200 lit/day	No	No	Yes	--	O&G	• POL collected in a tank through drain
38	ACC siding, Dhanbad	ECR	Cement & Clinker	Manual	1000 lit/day	Yes	Yes	No	PM	SS	• Green Belt
39	Panari Dalla siding, Salai, Banwa, Dhanbad	ECR	Coal	Mechanical	2500 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkling through tanker
40	Sendra Bansjora Colliery Siding, Bansjora, Dhanbad	ECR	Coal	Mechanical		Yes	No	No	PM	SS	
41	Dobari No.2 Colliery, Dhanbad	ECR	Coal	Mechanical	2500 lit/day	Yes	No	No	PM	SS	• Water Sprinkling through tanker
42	Sijna stalding Colliery, Sijna, Dhanbad	ECR	Coal	Mechanical	3000 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkling through tanker
43	CRC Railway Siding, Chandrapur	CR	Coal	Mechanical		Yes	Yes	No	PM	SS	• Water Sprinkling through sprinklers

Sl	Railway Sidings/Yards	Zone	Commodities Handle	Handling Mode	Water Requirement	Pollution Source			Type of pollution		Treatment Available
						Dust	Solid waste	POL	Air	Water	
											• Silo
44 Co	Amarkantak Thermal Power Station, Amlai, Bilaspur	SECR	Coal	Mechanical	5000 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkler
											•
45 Co	Manikpur Collery Siding	SECR	Coal	Mechanical	2000 lit/day	Yes	Yes	No	PM	SS	• Water Sprinkler
46 F	FCI siding, New Guwahati	NFR	Foodgrains	Manual	1000 lit/day	No	No	No	--	--	• Channel for drain & rain water
47 Ce	New Guwahati	NFR	Cement, Coal, POL	Manual & Mechanical (POL)	5000 lit/day	Yes	--	Yes	PM	--	• No system for POL waste • Natural trees
48 Mix	Sardarnagar	NER	Wheat, Clinker, Salt	Manual	100 lit/day	Yes	--	No	PM	--	•
49	Kusumbi (KHM)	NER	Coal	Manual	5000 lit/day	Yes	--	No	PM	--	•
50	Damagaria, Asansol	ER	Coal	Mechanical	2500 lit/day	Yes	--	No	PM	--	• Water Sprinkler
51	Bonjemari, Asansol	ER	Coal	Mechanical	100 lit/day	Yes	--	No	PM	--	•
52 M	R. B.Mining	WCR	Clay	Manual	200 lit/day	Yes	Yes	No	PM	--	•
53 F	Railway Siding (ITC, Adani, Deviprakash Stayadev Tolaram Co.)	WCR	DOC, Wheat	Manual	250 lit/day	No	No	No	No	--	•
54 Ce	Shree Cement Pvt. Rly Siding	NWR	Cement Clinker,Cement bags,Coal, Gypsum	Mechanical	500 lit/day	Yes	Yes	No	PM	--	• Plantation
55 Mix	Railway Siding, Ajmer Division	NWR	SSP, Wheat	Manual	200 lit/day	No	No	No	No	--	• Bagged product

ANNEXURE 4.1

NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Time Weighted Average	Industrial, Residential, Rural & Other Area	Ecologically Sensitive Area (notified by Central Government
Sulphur Dioxide (SO_2), µg/m^3	Annual 24 Hours**	50 80	20 80
Nitrogen Dioxide as NO_2, µg/m^3	Annual 24 Hours**	40 80	30 80
Particulate Matter (size less than 10µm) or PM_{10} µg/m^3	Annual 24 Hours**	60 100	60 100
Particulate Matter (size less than 2.5µm) or PM2.5 µg/m^3	Annual * 24 Hours**	40 60	40 60
Ozone (O3), µg/m^3	8 hours** 24 Hours**	100 180	100 180
Lead (Pb), µg/m^3	Annual * 24 Hours**	0.50 1.0	0.50 1.0
Carbon Monoxide (CO) mg/m^3	8 Hours** 1 Hour**	02 04	02 04
Ammonia (NH_3), µg/m^3	Annual * 24 Hours**	100 400	100 400
Benzene (C_6H_6), µg/m^3	Annual *	05	05
Benzo (a) pyrene (BaP) particulate phase only ng/m^3	Annual *	01	01
Arsenic (AS), ng/m^3	Annual *	06	06
Nickle (Ni) ng/m^3	Annual *	20	20

Source: *Central Pollution Control Board Notification dated* 18th November 2009

** Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week hourly at uniform intervals*

*** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.*

ANNEXURE 4.2

NATIONAL AMBIENT NOISE STANDARDS

Category of Zones	Leq in dB (A)	
	Day *	Night
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence Zone **	50	40

Source: *Central Pollution Control Board*

* *Day Time is from 6.00 AM to 9.00 PM.*

** ***Silence Zone*** *is defined as an area up to 100m around premises of Hospitals, Educational Institutions and Courts. Use of vehicle horn, loudspeaker and bursting of crackers is banned in these zones.*