BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

PRINCIPAL BENCH, NEW DELHI

Original Application No. 537/2022

In the matter of:

Mukesh Kumar Chouhan … Applicant

Vs.

State of U.P. & Ors. … Respondents

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Filed by Advocate Saurabh Balwani
(on behalf of Central Pollution Control Board)

Place: Delhi
Dated:06.11.2024

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

PRINCIPAL BENCH, NEW DELHI

Original Application No. 537/2022

In the matter of:

Mukesh Kumar Chouhan ... Applicant

Vs.

State of U.P. & Ors. ... Respondents

REPLY/ RESPONSE ON BEHALF OF THE RESPONDENT NO. 10 (CENTRAL POLLUTION CONTROL BOARD) IN CAPTIONED ORIGINAL APPLICATION

MOST RESPECTFULLY SHOWETH:

1. That, the Hon'ble NGT vide order dated 25.09.2024 has sought the reply of Central Pollution Control Board (CPCB) in the instant matter. Thereby, the reply is made in succeeding paragraphs.

2. That at the outset, the answering respondent denies all claims, contentions, allegations and averments against answering respondent CPCB in the above O.A. contrary to anything stated or submitted in this reply. Nothing in the O.A. may be deemed to have been accepted or admitted by the answering Respondent for want of a specific denial save and except any averment which has been expressly admitted hereinafter.

3. That, CPCB is a statutory Board constituted under Section 3 of The Water (Prevention and Control of Pollution) Act, 1974. It performs the functions under The Water (Prevention and Control of Pollution) Act, 1974, The Air (Prevention

and Control of Pollution) Act, 1981, and The Environment (Protection) Act, 1986.

4. That during the hearing on 25.09.2024 in the instant matter the Hon'ble Principal Bench NGT was pleased to direct and implead CPCB as necessary party to the present O.A. for proper adjudication. The Copy of the Order dated 25.09.2024 passed by this Hon'ble Tribunal is attached herewith as **Annexure -I.**

5. That Hon'ble NGT (Principle Bench) vide order dated 05.09.2022 in the instant matter constituted a Joint Committee comprising of representative of CPCB, State PCB, and District Magistrate, Aligarh, with direction to verify the factual position and submit its report. The State PCB was the nodal agency for coordination and compliance.

6. That the Joint Committee comprising officials of CPCB, Regional Officer, U.P. Pollution Control Board Aligarh and District Administration Aligarh visited the site on 10.11.2022. The reports of Joint Committee were filed vide emails on 01.12.2022, 21.12.2022 and 11.01.2023. These reports were acknowledged vide order dated 20.02.2023. Further, vide order dated 02.11.2023, the order in the instant matter was reserved.

7. That the railway sidings falls under Green category as per "Final Document on Revised Classification of Industrial Sectors under Red, Orange, Green and White Categories", prepared by CPCB in 2016. *(https://cpcb.nic.in/openpdffile.php?id=TGF0ZXN0RmlsZS9MYXRlc3RfMTE4X0ZpbmFsX0RpcmVjdGlvbnMucGRm)*. The said Final Document on Revised Classification of Industrial Sectors under Red, Orange, Green and White Categories", prepared by CPCB in 2016 is attached herewith as **Annexure-II**

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8. That the CPCB has published a report "***Inventorization of Railway Sidings and Guidelines for their Environment Management***" in year 2015. The aforesaid report/guidelines is attached herewith as Annexure-III.

9. That it is submitted that the as per the aforesaid report/guidelines, the owner shall implement pollution mitigation measures at the railways siding, which will be supervised and co-ordinated by an environmental management unit of the owner.

10. That the aforesaid report/guidelines outlines the following salient **measure to control dust pollution** due to loading and unloading of activities at sidings sites:

- Loading and unloading should be directly from trucks to wagons and wagons to trucks
- Adopt a mechanized wagon loading system
- All storage & material handling systems should be under the closed shed
- Unpaved roads should be paved at the siding
- 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
- Regulation of vehicular movement at the siding area to avoid traffic congestion

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N.C.T. of Delhi
Regd. No. 1513
GOVT. OF INDIA

- Emissions from the heavy-duty vehicles operating in and out of siding shall follow the standard under Motor Vehicles Rules
- Native species having characteristics of attenuation of pollution & fast growing tress up to a 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
- The cement left at the ground during loading and unloading should have a proper collection, repackaging facility
- Temporarily storage facility should be designed in such a way that wastes stored are not exposed to the open atmosphere
- 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
- The concern siding owner will undertake environmental monitoring on periodic basis
- The monitoring will be undertaken in order to ensure compliance with all aspects or requirements of the Environmental Measures

11. That the aforesaid report/guidelines outlines the following salient **measures to control water pollution** at cement siding sites:

- The wastewater should be re-used for plantation, road washing, or sprinkling after providing proper treatment

- The operating area should be concreted/stone pitched with a proper gradient to channel the runoff into the storm water drain and to prevent groundwater 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 the maximum frequency of traffic

- Proper maintenance of open drainage system to avoid choking

- Domestic effluent shall be properly treated

- Drainage must be controlled to ensure that run off 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 an existing sewerage system, all necessary regulatory requirements should be adhered to

- In case wastewater contains any harmful substance which is harmful to the environment, the same shall be treated to remove it so as to meet the prescribed norms

- Adoption of rainwater harvesting scheme to recharge groundwater

12. That in addition to the above, the report/guidelines also outlines the following salient **measures to control the noise Pollution**:

- Proper and timely maintenance of loading & unloading machinery.

- Provision of Green Belt for noise control,

- Provision of providing ear-muffs/ear-plugs to the operators and workers working in the high-noise areas
- The operator's cabins (control rooms) shall be properly v(acoustically) insulated with special doors and observation windows,
- The silencers and mufflers of the individual machines shall be regularly checked,
- Use of noise-absorbing material in enclosures of machine /equipment,
- Provision of wind dust wall which also acts as noise barrier to some extent,
- Restriction on the use of high-pressure horns within the siding and surrounding area.

13. That the above report/guidelines were released on 15.03.2015 and are available on CPCB's website in Technical Reports section.

14. That, in view of the submissions made in preceding paragraphs, the answering respondent i.e. CPCB shall abide by the orders/directions passed by the Hon'ble Tribunal in the instant matter.

(Nazimuddin)
Scientist 'F'
Central Pollution Control Board

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Regd. No. 1513
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BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

PRINCIPAL BENCH, NEW DELHI

Original Application No. 537/2022

In the matter of:

Mukesh Kumar Chouhan ... Applicant

Vs.

State of U.P. & Ors. ... Respondents

AFFIDAVIT

I, **Nazimuddin** working as Scientist 'F' in Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi, the Respondent No. 10 in the above matter, do hereby solemnly affirm, declare on oath and state as under:-

1. That I, the deponent herein is authorized representative to represent the Respondent CPCB in the present case, and as such, I am well conversant with the facts and circumstances of the present case on the basis of the information derived from the official records, and hence, I am competent and authorized to verify, sign and swear this affidavit on behalf of the Respondent CPCB.

2. That the accompanying reply may be read part and parcel of the present affidavit.

3. That the accompanying reply has been drafted and filed under my instructions and authority the contents thereof are true and correct on the basis of the record maintained during ordinary course of business of CPCB and available records and documents and the contents of the same are read over and explained to me and are not repeated herein for the sake of brevity.

DEPONENT

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N.C.T. of Delhi
Regd. No. 1513
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नाज़िमउद्दीन / Nazimuddin
वैज्ञानिक 'एफ' / Scientist 'F'
केंद्रीय प्रदूषण नियंत्रण बोर्ड
Central Pollution Control Board
(पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार)
(M/o Environment, Forest And Climate Change, Govt. of India)
परिवेश भवन, पूर्वी अर्जुन नगर, दिल्ली–110032
Parivesh Bhawan, East Arjun Nagar, Delhi-110032

VERIFICATION:

Verified at New Delhi on this day of 06 NOV 2024 2024 that the contents of the above reply are correct and true on the basis of the records of the case as mentioned in the day-to-day affairs of the CPCB. Nothing has been concealed therefrom or mis-stated.

DEPONENT

नाज़िमउद्दीन / Nazimuddin
वैज्ञानिक 'एफ' / Scientist 'F'
केंद्रीय प्रदूषण नियंत्रण बोर्ड
Central Pollution Control Board
(पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार)
(M/o Environment, Forest And Climate Change, Govt. of India)
परिवेश भवन, पूर्वी अर्जुन नगर, दिल्ली–110032
Parivesh Bhawan, East Arjun Nagar, Delhi-110032

NOTARY PUBLIC
R.L. Chaudhary
N.C.T. of Delhi
Regd. No. 1513
GOVT. OF INDIA

ATTESTED
NOTARY PUBLIC
GOVT. OF INDIA
06 NOV 2024

Annexure-I

Item No. 1 to 3 (Court No. 2)

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI.

(Through Physical Hearing with Hybrid VC Option)

Original Application No. 537/2022

Mukesh Kumar Chouhan ...Applicant

Versus

State of U.P. & Ors. ...Respondents

With

Original Application No.426/2023

Surendra Singh Chouhan ...Applicant

Versus

State of U.P. & Ors. ...Respondents

With

Original Application No. 457/2023

S.S. Singh ...Applicant

Versus

State of U.P. & Ors. ...Respondents

Date of hearing: 25.09.2024

CORAM: HON'BLE MR. JUSTICE ARUN KUMAR TYAGI, JUDICIAL MEMBER.
HON'BLE DR. AFROZ AHMAD, EXPERT MEMBER.

Applicants: None for the applicants.

Respondents: Mr. Nishant Datta and Mr. Chirag Rathi, Advocates for M/s Vision Next Road (through VC).
Mr. Pradeep Misra and Mr. Daleep Dhyani, Advocates for UPPCB (through VC).
Mr. Gi. Gi. C. George for Railways (through VC).

Mr. Shlok Chandra and Mr. Sankalp Sharma, Advocates for M/s. Mangalam Cement and M/s. J.K Cement. (through VC).

Application is registered based on a letter petition received by Email.

ORDER

1. The grievance in the present applications registered on letter petitions are that J.K. company and other companies are getting clinker, required by them for manufacture of cement, transported to Harduaganj Railway station near village Satha District Aligarh. During loading/unloading, clinker evaporates causing damage to the environment, grave harm to wildlife and posing serious health hazards to local residents.

2. Vide order dated 05.09.2022, this Tribunal constituted a Joint Committee comprising of representative of CPCB, State PCB, and District Magistrate, Aligarh with direction to verify the factual position and submit its report.

3. In compliance thereof, report of the Joint Committee was filed vide email dated 01.12.2022.

4. In the course of hearing State of Uttar Pradesh, UPPCB, District Magistrate, Aligarh, North Central Railway, M/s. J.P. Cement, M/s. Mangalam Cement, M/s. Vision Next Road Logistics Pvt. Ltd. and M/s. P & P Exim Pvt. Ltd. were impleaded as respondents.

5. Reports/Replies were filed by UPPCB, District Magistrate, Aligarh and Project Proponents, respondents no. 5 to 8. Arguments were heard and order was reserved but on going through the material placed on record the cases have been relisted as presence of the Railway Board and

CPCB is essential for just and proper adjudication of the environmental questions involved and also regarding steps taken by it for due implementation of the directions already issued by this Tribunal in number of original applications filed for similar relief and also further directions required to be issued in respect of railway-sidings/railway stack yard. Accordingly, Railway Board and CPCB are impleaded as respondent no. 9 and 10. The Registry is directed to amend memo of parties and issue notices to newly added respondents no. 9 and 10 requiring them to file their reply/response at least week before the date of hearing hereby fixed.

6. In its reply respondent no. 4 had mentioned about issuance of tender and allotment and execution of work regarding upgradation of existing goods shed with targeted date of completion being 28.09.2024 but details of the upgradation work were not mentioned and the material on record is not conclusive regarding adequacy thereof and further hearing is required for ascertaining the status as well as adequacy of the upgradation work for control/abatement of environmental pollution. Respondent no. 4 is directed to file additional reply/report regarding status of the work and also adequacy thereof for control/abatement of environmental pollution.

7. List on 07.11.2024 for further consideration

Arun Kumar Tyagi, JM

Dr. Afroz Ahmad, EM

September 25th 2024
ag

Annexure- II

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
(पर्यावरण एवं वन मंत्रालय, भारत सरकार)
(MINISTRY OF ENVIRONMENT & FORESTS, GOVT. OF INDIA)

No.B-29012/ESS(CPA)/2015-16/ March 07, 2016

To

The Chairman
All the State Pollution Control Boards / Pollution Control Committees
(List Attached)

SUB: MODIFIED DIRECTIONS UNDER SECTION 18(1)(b) OF THE WATER (PREVENTION & CONTROL OF POLLUTION) ACT, 1974 and THE AIR (PREVENTION & CONTROL OF POLLUTION) ACT, 1981 REGARDING HARMONIZATION OF CLASSIFICATION OF INDUSTRIAL SECTORS UNDER RED / ORANGE / GREEN / WHITE CATEGORIES.

WHEREAS, under section 16 (2)(b) of the Water (Prevention and Control of Pollution) Act, 1974 and under Section 16 (2)(c) of the Air (Prevention & Control of Pollution) Act, 1981, one of the functions of the Central Pollution Control Board (CPCB), constituted under the Water (Prevention and Control of Pollution) Act, 1974, is to coordinate activities of the State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs); and

WHEREAS, under section 16 (2)(c) of the Water (Prevention and Control of Pollution) Act, 1974 and under Section 16 (2)(d) of the Air (Prevention & Control of Pollution) Act, 1981, one of the functions of the CPCB is to provide technical assistance and guidance to SPCBs and PCCs; and

WHEREAS, it was brought to the notice of CPCB, that different SPCBs /PCCs were following different criteria for classification of industrial sectors under Red/Orange/ Green category and that classification was being used by the SPCBs/PCCs for grant of consents to industries and for Inventorization / surveillance of industries.

WHEREAS, the issue regarding classification of industries was deliberated upon in the 56th Conference of Chairmen & Member Secretaries of CPCB & SPCBs/PCCs held on August 31, 2010 and a working group comprising of representatives from SPCBs & CPCB was constituted to prepare a consolidated list of industrial sectors falling under Red/Orange/Green category to bring uniformity in classification of industrial sectors across the country;

'परिवेश भवन' पूर्वी अर्जुन नगर, दिल्ली-110032
'Parivesh Bhawan', East Arjun Nagar, Delhi - 110032
दूरभाष/Tel. : 43102030, फैक्स/Fax : 22305793, 22307078, 22307079, 22301932, 22304948
ई-मेल/e-mail : cpcb@nic.in वेबसाईट/Website : www.cpcb.nic.in

WHEREAS, the report prepared by the Working Group was discussed in the 57th Conference of Chairmen & Member Secretaries of CPCB& SPCBs/PCCs held in Delhi on September 15, 2011, wherein some modifications were proposed;

WHEREAS, the final report of the working group was prepared, incorporating the suggestions/observations made in the 57th Conference of Chairmen and Member Secretaries of CPCB & SPCBs/PCCs and in exercise of the powers delegated to the Chairman, CPCB under Section 18(1)(b) of the Water Act, 1974, following directions were issued for compliance to all SPCBs/PCCs to maintain uniformity in categorization of industries as red, orange and green as per list finalized by CPCB, which identified 85 types of industrial sectors as 'Red', 73 industrial sectors as 'Orange' and 86 sectors as 'Green':

a). To maintain uniformity in categorization of industries under Red/ Orange/Green category, the SPCBs /PCCs shall adopt the list as finalized by CPCB based on the recommendations of that Working Group for grant of Consent, inventorization of industries under Red, Orange and Green categories and other related activities.

(b). The SPCBs/PCCs shall revise the list of Red, Orange and Green categories of industries operating in their jurisdiction based on the criteria specified in the final report of that Working Group and submit the same to CPCB within 90 days in hard copy as well as soft copy;

WHEREAS, later-on, it was observed that the process of categorization thus far was primarily based on the size of the industries and consumption of resources and pollution due to discharge of emissions and effluents and its likely impact on health was not considered as primary criteria;

WHEREAS, there have been proposals from the SPCBs / PCCs and industrial associations for categorization of the industrial sectors in a more pragmatic manner. The issue was discussed during the national level conference of the Environment Ministers of the States, held in New Delhi during April 06-07, 2015 and also during the Conference of the Chairmen and Member Secretaries of CPCB and SPCBs/PCCs held in New Delhi on April 08, 2015. Accordingly, a 'Working Group' comprising of the Members from Central Pollution Control Board and State Pollution Control Boards representing the States of Andhra Pradesh, Punjab, Tamilnadu, West Bengal, Madhya Pradesh and Maharashtra, was constituted to revisit the criteria of categorization of industries and suggest rationale based on pollution potential for categorization of industrial sectors and adopting it for implementation of pollution control plan;

WHEREAS, the Working Group has developed the criteria of categorization of industrial sectors based on the concept of Pollution Index which is a function of the emissions (air pollutants), effluents (water pollutants), hazardous wastes generated and consumption of resources. For this purpose the references are taken from the the Water (Prevention and Control

of Pollution) Cess (Amendment) Act, 2003, Standards so far prescribed for various pollutants under Environment (Protection) Act , 1986 and Doon Valley Notification, 1989 issued by MoEFCC. The Pollution Index (PI) of any industrial sector is a number from 0 to 100 and the increasing value of PI denotes the increasing degree of pollution load from the industrial sector;

WHEREAS , based on the series of consultations with SPCBs, different Government / Non-government Institutions including industries and MoEFCC , the following criteria on 'Range of Pollution Index 'for the purpose of categorization of industrial sectors has been finalized:

- Industrial Sectors having Pollution Index score of 60 and above – Red category
- Industrial Sectors having Pollution Index score of 41 to 59 -Orange category
- Industrial Sectors having Pollution Index score of 21 to 40 -Green category
- Industrial Sectors having Pollution Index score incl. & upto 20 -White category

WHEREAS, based on the revised criteria, the 'Final Report on Revised Categorization of Industrial Sectors under Red/Orange/Green/White' has been evolved. The 'Categorization' is based on the relative pollution potential of the industrial sectors and grouping of the industrial sectors based on the use of raw materials, manufacturing process adopted and pollutants likely to be generated;

WHEREAS, based on relative Pollution Index, the number of industries in various categories are as under :

i. The Red category of industrial sectors: 60
ii. The Orange category of industrial sectors: 83
iii. The Green category of industrial sectors: 63 and
iv. The Newly introduced White category: 36

WHEREAS, there shall be no necessity of obtaining the Consent to Operate'' for White category of industries and an intimation to concerned SPCB / PCC shall suffice;

WHEREAS, the purpose of categorization is to ensure that the industry is established in a manner consistent with the environmental objectives and to prompt industrial sectors to adopt cleaner technologies, ultimately resulting in generation of no or minimum pollutants.

WHEREAS the new categorization system shall also facilitate in self-assessment by industries;

Now, therefore, in exercise of the powers delegated to the Chairman, CPCB under Section 18(1)(b) of the Water (Prevention & Control of Pollution) Act, 1974 and Section 18(1)(b) of the Air (Prevention & Control of Pollution), Act , 1981 the earlier Directions issued in June 2012 in the context of categorisation of industries as Red, Orange & Green are withdrawn with immediate effect and following **'Directions'** are hereby issued for compliance by all SPCBs and PCCs :

1. That the SPCBs and PCCs shall adopt the Revised Criteria of categorization of industrial sectors as detailed in table nos. F1, F2, F3 and F4 and Revised Lists of Red, Orange, Green and White categories of industrial sectors, presented at table no. G2, G3, G4 and G5 respectively, in the 'Final Report' as attached herewith immediately.
2. That all pending applications for consideration of 'Consent to Establish' and 'Consent to Operate' and future such applications shall be processed as per revised criteria.
3. That the SPCBs and PCCs will provide the list of industries identified in each category existing in the State which have been considered for grant of consents. SPCBs/PCCs will forward the list of such industries before 31.05.2016 and the same will be uploaded on the websites of respective SPCB/PCC.

4. That the 'Revised Lists of Red, Orange, Green and White category of industrial sectors' shall be used by the SPCBs and PCCs for Consent Management and inventorization of industries under Red, Orange ,Green and White categories. Siting of industries shall be only in conforming areas. SPCBs / PCCs shall evolve sector specific plans for control of pollution and industrial surveillance for verifying compliance.

5. That the SPCBs and PCCs shall revise /prepare the inventory of Red, Orange, Green and White categories of industries operating in their jurisdiction based on the revised criteria specified in the Final Report and submit the same to CPCB within 90 days i.e., before 30.05.2016 in hard copy as well as soft copy.

6. That the listed category of industries or those identified later-on under different categories shall not be linked to sanction of loan /finance or bank proceedings.

7. That any further addition of any new or left-over industrial sector and their categorization which is not listed in the revised list of Red, Orange, Green and White industrial sectors, shall be done at the level of concerned SPCB /PCC following revised criteria & guidelines as detailed in the attached document and no concurrence of CPCB shall normally be required. It is further clarified that while categorizing the industries, fractional numbers shall be rounded off to nearest integer.

The SPCBs/PCCs shall acknowledge the receipt of directions and submit the 'Action Taken Report' in compliance with these directions to CPCB before 15.04.2016.

(Arun Kumar Mehta)
Chairman
7/3/16

Copy to:

1. The Chief Secretary of all the States and UTs
2. The Secretary ,
   Ministry of Micro, Small and Medium Entrepreneurs
   Udyog Bhawan, Rafi Marg, New Delhi - 110 011
3. The Secretary ,
   Ministry of Heavy Industries
   Udyog Bhawan, Rafi Marg, New Delhi - 110 011
4. The Secretary,
   Ministry of New and Renewable Energy
   Block-14, CGO Complex,
   Lodhi Road,New Delhi-110 003,
5. The Advisor(CP Division)
   Ministry of Environment ,Forests and Climate Change
   Indira Paryavaran Bhawan
   Jor Bagh Road, New Delhi – 110 003
6. All Zonal Offices of CPCB

(A. B. Akolkar) 3.3.16
Member Secretary

Final Document on Revised Classification of Industrial Sectors Under

Red, Orange, Green and White Categories

(February 29, 2016)

Central Pollution Control Board

Delhi

502

Executive Summary

Categorization of Industrial Sectors under Red, Orange, Green and White Category

The Ministry of Environment, Forest and Climate Change (MoEFCC) had brought out notifications in 1989, with the purpose of prohibition/ restriction of operations of certain industries to protect ecologically sensitive Doon Valley. The notification introduced the concept of categorization of industries as " Red", "Orange "and "Green" with the purpose of facilitating decisions related to location of these industries. Subsequently, the application of this concept was extended in other parts of the country not only for the purpose of location of industries, but also for the purpose of Consent management and formulation of norms related to surveillance / inspection of industries.

The concept of categorization of industries continued to evolve and as different State Pollution Control Boards interpreted it differently, a need arose to bring about necessary uniformity in its application across the country. In order to harmonize the 'Criteria of categorization', Directions were issued by CPCB under Section 18(1)(b) of the Water (Prevention & Control of Pollution) , Act, 1974 to all SPCBs/PCCs to maintain uniformity in categorization of industries as red, green and orange as per list finalized by CPCB, which identified 85 types of industrial sectors as 'Red', 73 industrial sectors as 'Orange' and 86 sectors as 'Green'.

The process of categorization thus far was primarily based on the size of the industries and consumption of resources. The pollution due to discharge of emissions & effluents and its likely impact on health was not considered as primary criteria. There was demand from the SPCBs / PCCs and industrial associations for categorization of the industrial sectors in a more transparent manner. Accordingly, the issue was discussed thoroughly during the national level conference of the Environment Ministers of the States, held in New Delhi during April 06-07, 2015 and a 'Working Group' comprising of the members from CPCB, APPCB, TNPCB, WBPCB, PPCB, MPPCB and Maharashtra PCB is constituted to revisit the criteria of categorization of industries and recommend measures for making the system transparent and rational.

The Working Group has developed the criteria of categorization of industrial sectors based on the Pollution Index which is a function of the emissions (air pollutants), effluents (water pollutants), hazardous wastes generated and consumption of resources. For this purpose the references are taken from the the Water (Prevention and Control of Pollution) Cess (Amendment) Act, 2003, Standards so far prescribed for various pollutants under Environment (Protection) Act , 1986 and Doon Valley Notification, 1989 issued by MoEFCC. The Pollution Index PI of any industrial sector is a number from 0 to 100 and the increasing value of PI denotes the increasing degree of pollution load from the industrial sector. Based on the series of brain storming sessions among CPCB, SPCBs and MoEFCC , the following criteria on 'Range of Pollution Index 'for the purpose of categorization of industrial sectors is finalized.

- Industrial Sectors having Pollution Index score of 60 and above – Red category
- Industrial Sectors having Pollution Index score of 41 to 59 –Orange category
- Industrial Sectors having Pollution Index score of 21 to 40 –Green category
- Industrial Sectors having Pollution Index score incl.&upto 20 -White category

The newly introduced White category of industries pertains to those industrial sectors which are practically non-polluting such as Biscuit trays etc. from rolled PVC sheet (using automatic vacuum forming machines), Cotton and woolen hosiers making (Dry process only without any dying/washing operation), Electric lamp (bulb) and CFL manufacturing by assembling only, Scientific and mathematical instrument manufacturing, Solar power generation through photovoltaic cell, wind power and mini hydel power (less than 25 MW).

The salient features of the 'Re-categorization' Exercise are as follows :

- Due importance has been given to relative pollution potential of the industrial sectors based on scientific criteria . Further, wherever possible, splitting of the industrial sectors is also considered based on the use of raw materials, manufacturing process adopted and in-turn pollutants expected to be generated.
- The Red category of industrial sectors would be 60.
- The Orange category of industrial sectors would be 83.
- The Green category of industrial sectors would be 63.
- Newly introduced White category contains 36 industrial sectors which are practically non-polluting.
- There shall be no necessity of obtaining the Consent to Operate'' for White category of industries. An intimation to concerned SPCB / PCC shall suffice.
- No Red category of industries shall normally be permitted in the ecologically fragile area / protected area.

The purpose of categorization is to ensure that the industry is established in a manner which is consistent with the environmental objectives. The new criteria will prompt industrial sectors willing to adopt cleaner technologies, ultimately resulting in generation of fewer pollutants. Another feature of the new categorization system lies in facilitating self-assessment by industries as the subjectivity of earlier assessment has been eliminated. This 'Re-categorization' is a part of the efforts, policies and objective of present government to create a clean & transparent working environment in the country and promote the Ease of Doing Business.

Other similar efforts include installation of Continuous Online Emissions/ Effluent Monitoring Systems in the polluting industries, Revisiting of the CEPI (Comprehensive Environment Pollution Index) concept for assessment of polluted industrial clusters, Revision of existing industrial Emission/Effluent discharge standards, initiation of special drive on pollution control activities in Ganga River basin and many more in coming future.

Revised Criteria of Categorization of Industries

"Securing industrial pollution control in accordance with the Water (Prevention & Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981 by linking with categorization of industries, consent management and vigilance – 'In context of Red, Orange, Green and White categories of industries"

A: Genesis of Categorization:

- The Ministry of Environment, Forest and Climate Change (MoEFCC) had brought out notifications, which inter-alia refers to Prohibition/ Restriction on operation of industries to protect ecologically sensitive areas or areas of specific importance. This has for the first time brought the concept of categorization of industries to" Red", "Orange "and "Green" and restrict their operation in certain areas of importance. Therefore, it is at-once interpreted that Red, Orange and Green categorization is linked with location specific needs.
- The notification of MoEF was first brought on 2nd February,1989 in case of "Restriction on location of industries, mining operations and other developmental activities in Doon Valley in "Uttarakhand" and thereafter another notification on 24th February 1999 regarding restriction on the setting up of industries in Dahanu Taluka in Maharashtra. The categorization had been made mainly on the basis of size of the industries, man power and consumption of resources.
- However, in other parts of the country, there have been variations in context to the classification of industries under Red, Orange and Green categories. SPCBs / PCCs were following their own criteria in different States thereby creating confusion.
- In order to harmonize the 'Criteria of categorization', a 'Working Group' was formed as per resolution passed during the 57th Conference of the Chairmen & Member Secretaries of CPCB and SPCBs. Based on the recommendations of the Working Group, Directions dated 4/6/2012 under Section 18(1)(b) of the Water

(Prevention & Control of Pollution) , Act, 1974 were issued to all SPCBs/PCCs with the effects to maintain uniformity in categorization of industries as red, green and orange as per list finalized by the Working Group. This indicative list included 85 types of industrial sectors as 'Red', 73 industrial sectors as 'Orange' and 86 sectors as 'Green'. However, these identified categories have not been assigned with scores as per existing criteria/ or any new criteria

B: Categorization criteria used by SPCBs/PCCs:

SPCBs and PCCs use the criteria of Red, Orange and Green categories for consent management and vigilance purposes for carrying out inspections to verify compliance to the stipulated standards. However the above categorization do not emphasize on sector-specific plan for control of pollution in accordance with priority based on pollution index.

C: Gap in the process:

1. The categorization has been made mainly on the basis of size of the industries and consumption of resources. The pollution due to discharge of emissions & effluents and its impact on health was not considered as primary criteria.
2. Categorization was on random basis, no scoring system was adopted.

D: Resolutions made during National Level Conferences

The issue was discussed thoroughly during the following national level conferences held in New Delhi:

- Conference of the Environment Ministers of Central Government and State Governments during April 06-07, 2015
- 59th Conference of Chairmen & Member Secretaries of Pollution Control Boards / Pollution Control Committees held on April 08, 2015

Accordingly following resolutions were made during the Conferences:

1. *A 'Working Group' comprising of the members from CPCB, APPCB, TNPCB, WBPCB, PPCB, MPPCB and Maharashtra PCB is constituted.*
2. *This WG shall revisit the categorization of industries that is based on pollution index criteria & environmental issues such as generation of emission, effluent and hazardous wastes.*
3. *The categorization will be done on the basis of composite score (0-100 marks) of Pollution Index given in accordance with the following weightage.*

Air Pollution Score based on parameters namely PM, CO, NOx, SOx, HMs , Benzene, Ammonia and other toxic parameters relevant to the industry.	*40 Marks*
Water Pollution Score based on parameters namely pH, TSS, NH_3-N, BOD, Phenol and other toxic pollutants relevant to the industry.	*40 Marks*
Hazardous wastes (land fillable, incinerable, recyclable) as generated by the industry.	*20 Marks*
Note : • *Parameters to be decided on the basis of the nature of the wastes generating from the industrial sector.* • *Industries having only either water pollution or air pollution, the score will be normalized wrt 100.*	

4. *Based on the score of the Pollution Index, following categorization be made :*
   - *Type of industries, if scores 60 and above be categorized as Red*
   - *Type of industries, if scores from 30 to 59 be categorized as Orange*
   - *Type of industries, if scores from 15 to 29 be categorized as Green*
   - *Type of industries, if less than 15 be categorized as White or non-polluting industry.*
5. *SPCBs/PCCs may issue consent to the industries*
   - *Red category of industries for 5 years.*
   - *Orange category of industries for 10 years.*
   - *Green category of industries for 15 years.*
   - *No necessity of consent for non-polluting industries.*
6. *No red categories of industries will be permitted to establish in eco-sensitive areas and protected areas.*

E: Follow-up Actions made on the Resolutions :-

- Accordingly, a Committee comprising the Chairmen of CPCB, APPCB, TNPCB, MPPCB, MPCB, PPCB, WBPCB and MS, CPCB was constituted vide CPCB OM dated

23.04.2015 to review & classify industrial sectors into different categories based on criteria of respective pollution potential.

- The categorization is made on the basis of following:
    - Quality of emissions (air pollutants) generated
    - Quality of effluents (water pollutants) generated
    - Types of hazardous wastes generated
    - Consumption of resources

- Reference is taken from the following :
    - The Water (Prevention and Control of Pollution) Cess Act, 1977
    - Standards so far prescribed for various pollutants under the Environment (Protection) Act , 1986
    - Doon Valley Notification, 1989 issued by MoEF.

F : Scoring Methodology :

The details on the scoring methodology in respect of the aforesaid 3 components is presented in the following tables F-1 to F-4 .

Table F-1 : Water Pollution Scoring Methodology

Sl. No.	Activity / Types of Discharges	Score
Part A : Score W1 : Score based on types of expected criteria water-pollutants present in industrial processes waste waters. **Maximum of the following seven categories is to be taken.**		
W11	Waste-water which is polluted and the pollutants are - • not easily biodegradable (very high strength waste waters having BOD > 5000 mg/l); or • toxic; or • both toxic and not easily biodegradable. (Presence of criteria water pollutants having prescribed standard limits up-to 10 mg/l or having BOD > 5000 mg/l). For details appendix 1 may be referred)	30
W12	Non-toxic high strength polluted waste-water having BOD in the range of 1000-5000 mg/l and the pollutants are biodegradable. (Presence of criteria water pollutants having prescribed standard limits from 11 mg/l to 250 mg/l and having BOD strength in the range of 1000-5000 mg/l) . For details appendix 1 may be referred)	25
W13	Non toxic- polluted waste-water having BOD below 1000 mg/l and the pollutants are easily biodegradable. (Presence of criteria water pollutants having prescribed standard limits from 11mg/l to 250 mg/l and having BOD strength below 1000 mg/l) . For details appendix 1 may be referred)	20
W14	Waste-water generated from the chemical processes and which is polluted due to presence of high TDS (total dissolved solids) of inorganic nature. (Presence of criteria water pollutants having prescribed standard limits more than 250 mg/l. For details appendix 1 may be referred)	15
W15	Waste-water generated from the physical unit operations / processes and which is polluted due to presence of TDS (total dissolved solids) of inorganic nature and of natural origin like fresh-water RO rejects, boiler blow-downs, brine solution rejects etc. (Presence of criteria water pollutants having prescribed standard limits more than 250 mg/l. For details appendix 1 may be referred)	12
W16	Non-toxic polluted waste-water from those units which are: • Having the overall waste-water generation less than 10 KLD and • The pollutants are easily bio-degradable having BOD below 200 mg/l which can be easily treated in a single stage ASP (activated	12

	sludge process) based Effluent Treatment Plant. Note : This is a special category and is applicable to only those units having over-all liquid waste generation less than 10 KLD with low strength organic load.	
W17	Waste-water from cooling towers and cooling-re-circulation processes	10
Part B : Score W2 : Score based on huge discharges of any kind (Penalty Clause)		
W2	Industry having overall liquid waste generation of 100 KLD or more including industrial & domestic waste-water.	10
Overall Water Pollution Score W = W1+W2		

Appendix 1

- **<u>Water Pollutants covered under Group W11:</u>**

  - ✓ Free available Chlorine , Total residual chlorine, Fluoride (as F), Sulphide (as S), Free Ammonical Nitrogen, Dissolved phosphates (as P), Free ammonia (as NH3), Nitrate Nitrogen, Mercury (As Hg), Selenium (as Se), Hexa-valent chromium (as Cr + 6), Lead (as Pb), Tin , Vanadium (as V), Cadmium (as Cd), Manganese (as Mn), Total chromium (as Cr), Copper (as Cu), Iron (as Fe), Nickel (as Ni), Zinc (as Zn), Benzene, Arsenic (as As), Benzo-a-pyrene, Cyanide (as CN), Phenolic compounds (as C_6H_5OH) , Adsorbable Organic Halogens (AOX), Boron and /or
  - ✓ BOD strength of waste water > 5000 mg/l

- **<u>Water Pollutants covered under Group W12:</u>**

  - ✓ Sodium Absorption Ratio (SAR) , Biochemical oxygen demand (3 days at 27^{o}C), Total Kjeldahl nitrogen (TKN), Ammonical nitrogen (as N), Suspended solids, Total nitrogen (as N), Chemical oxygen demand, Oils & grease and
  - ✓ BOD strength of waste water is in the range of 1000-5000 mg/l

- **<u>Water Pollutants covered under Group W13:</u>**

  - ✓ Sodium Absorption Ratio (SAR), Biochemical oxygen demand (3 days at 27^{o}C), Total Kjeldahl nitrogen (TKN), Ammonical nitrogen (as N), Suspended solids, Total nitrogen (as N), Chemical oxygen demand and
  - ✓ BOD strength of waste water is below 1000 mg/l

- **<u>Water Pollutants covered under Group W14 and W15:</u>**

  Chlorides as Cl, Colour , Total dissolved solids (TDS - Inorganic)

- **<u>Water Pollutants covered under Group W16</u>**

  - ✓ BOD strength of waste water is below 200 mg/l and overall discharge is less than 10 KLD.

Table F-2 : Air Pollution Score

Sl. No.	Air Pollutants Group	'Range of Prescribed Standard ' of criteria pollutants	Marks
Part 1 : Score A1 = Score based on types of expected criteria Air Pollutants present in the emissions . Maximum of the following seven categories is to be taken. For details appendix 2 may be referred.			
1	Group A1A	Presence of criteria air pollutants having prescribed standard limits up-to 2 mg/Nm3	30
2	Group A1B	Presence of criteria air pollutants having prescribed standard from 3 to10 mg/Nm3	25
3	Group A1C	Presence of criteria air pollutants having prescribed standard from 11 to 50 mg/Nm3	20
4	Group A1D	Presence of criteria air pollutants having prescribed standard from 51 to 250 mg/Nm3	15
5	Group A1E	Presence of criteria air pollutants having prescribed standard from 251mg/Nm3 & above.	10
6	Group A1F	• Generation of fugitive emissions of Particulate Matters which are: o Not generated as a result of combustion of any kind of fossil-fuel. o Generated due to handling / processing of materials without involving the use of any kind of chemicals. o Which can be easily contained /controlled with simple conventional methods	10
7	Group A1G	• Generation of Odours which are : o Generated due to application of binding gums / cements /adhesives /enamels o Which can be easily contained /controlled with simple conventional methods	10
Part 2 : Score A2 = Score based on consumption of fuels and technologies required for air pollution control :			
6	Group A2F1	• All such industries in which the daily consumption of coal/fuel is more than 24 MT/day and the particular (Particulate/gaseous/process) emissions from which can be controlled only with high level equipments / technology like ESPs, Bag House Filters, High Efficiency chemical wet scrubbers etc.	10
7	Group A2F2	• All such industries in which the daily consumption of coal/fuel is from 12 MT/day to 24 MT/day and the particular (Particulate/gaseous/process) emissions from which can be controlled with suitable proven technology.	5
Overall Air Pollution Score –A = A1 + A2			

Appendix 2

- **<u>Air pollutants covered under Group A1A:</u>**

  Cd+Th, Dioxins & Furans, Mercury, Asbestos

- **<u>Air Pollutants covered under Group A1B:</u>**

  HF, Nickel+ Vanadium, HBr, Manganese, Lead, H2S, P2O5 as H3PO4

- **<u>Air Pollutants covered under Group A1C:</u>**

  Chlorine, Pesticide compounds, CH3Cl, TOC, Total Fluoride, Hydrocarbons, NH3, HCL vapour & Mist, H2SO4 Mist, SO2

- **<u>Air Pollutants covered under Group A1D:</u>**

  CO, PM, CO, NOx

- **<u>Air Pollutants covered under Group A1E:</u>**

  NOx with liquid-fuel, SO2 with liquid-fuel

Table F-3: Hazardous Waste Generation Score

Sl.No.	**Types of Hazardous Waste Generated as** per Schedule 1 / Schedule 2 of Hazardous Waste (Management, Handling & Trans-boundary Movement) Rules , 2008 . **Maximum of the following four categories is to be taken**	**Score**
HW1	• Land disposable HW which require special care & treatment for stabilization before disposal.	20
HW2	• Incinerable HW	15
HW3	• Land disposable HW which doesn't require treatment & stabilization before disposal. • High volume low effect wastes such as fly-ash, phspho-gypsum, red-mud, slags from pyro-metallurgical operations, mine tailings and ore beneficiation rejects)	10
HW4	• Recyclable HW, which are easily recyclable with proven technologies.	10

Table F-4 : Calculation Sheet

Industrial Sector - .....

1. Water Pollution Score (W)			
Scores	Waste Water Category	Value	
Score on W1			
Score on W2			
Water Pollution Score = W1+W2			
2. Air Pollution Score (A)			
Scores	Air Pollutant Category	Value	
Score on A1			
Score on A2	-	-	
Air Pollution Score = A1+A2			
3. Hazardous Waste Score (HW)			
Score	HW Category	Value	
HW			
Grand Total = W + A + HW			

Note :

1. Any of the industrial sector having only either air pollution (A) or water pollution (W) , the score will be normalized to 100 as per the following formula –

   Normalized Score = {100 x W (or A)} / 40

2. Any of the industrial sector having air pollution (A) and water pollution (W) both but no hazardous waste generation (H) , the joint score of air & water pollution will be normalized to 100 as per the following formula –

   Normalized Score = {100 x (W+A)} / 80

3. Any of the industrial sector having air pollution (A) & hazardous waste generation (H) but no water pollution (W), the joint score of air pollution & hazardous waste generation will be normalized to 100 as per the following formula –

   Normalized Score = {100 x (A+H)} / 60

4. Any of the industrial sector having water pollution (W) and hazardous waste generation (H) but no air pollution (A), the joint score of water pollution & hazardous waste generation will be normalized to 100 as per the following formula –

   Normalized Score = {100 x (W+H)} / 60

G : Developments :

i. The existing Red (85 sectors) , Orange (73 sectors) and Green (86 sectors) i.e a total of 244 industrial sectors have been assessed as per the proposed formula by the Working Group. For this purpose, concerned Engineers / Scientists from the Member SPCBs were also involved & consulted during May 28-29, 2015.

ii. After careful examination and consideration of the suggestions of concerned stake-holders the "Draft Document on Revised Concept of Categorization of Industrial Sectors " was prepared by the Committee and circulated to all the SPCBs, PCCs and concerned Ministries for their information & comments. The ' Draft Document ' was uploaded on the website of CPCB also for information & comments of one & all.

iii. The matter was discussed during the 170th Board Meeting also and issues raised by the Board Members pertaining to some of the industrial sectors were clarified.

iv. Responses were received from various concerned Ministries, SPCBs, Industrial Associations including individuals.

v. Based on the above, final meeting was convened by the Secretary , MoEFCC with CPCB and senior officers of MoEFCC on January 06, 2016 to resolve the issues appropriately and finalize the 'Re-categorization'. Accordingly , following modifications in the 'Range of Pollution Index 'for the purpose of categorization of industrial sectors were suggested :

- Industrial Sectors having Pollution Index score of 60 and above – Red category
- Industrial Sectors having Pollution Index score of 41 to 59 –Orange category
- Industrial Sectors having Pollution Index score of 21 to 40 –Green category
- Industrial Sectors having Pollution Index score incl.& upto 20 –White category

vi. Based on the final criteria as described in v above , the final categorization is as follows :

Category of Industrial Sector	Existing Categorization	Proposed (New) categorization
Red	85	60
Orange	73	83
Green	86	63
White	---	36
Total	244	242

vii. In the proposed categorization, some of the industrial sectors have been either deleted due to duplication or merged with similar type of sectors on account of same

characteristics of pollution generation. In a similar way, some of the industrial sectors are split into more sectors on account of variation in the raw materials / manufacturing process. As a result final totals of the existing and proposed categorization are different.

viii. The industrial sector which doesn't fall under any of the above four categories (Red, Orange, Green and White) , decision with regard to its categorization will be taken at the level of concerned SPCB/PCC by a committee headed by the Member Secretary , SPCB/PCC and comprising of two senior cadre Engineers / Scientists of the SPCB / PCC in accordance with the scoring-criteria specified in this document.

ix. The summary is presented in the following Table G-1 and final lists of Red, Orange, Green and White categories of industries are presented in Tables G-2, G-3, G-4 and G-5 respectively, which are self explanatory.

Table G-1: Final Summary Table Red , Orange, Green and White Categories of Industries (16-01-16)

Sl No.	Original Categorization	Initial Nos.	Addition by Splitting into further classes	Deletion/ Shifting to foot-note due to vague term / Merger / other reasons	Re-categorization to Red	Re-categorization to Orange	Re-categorization to Green	Re-categorization to White	Check
		1	2	3	4	5	6	7	(1+2) = (3 to 7)
1	Red	85	11	7	60	26	3	Nil	96=96
2	Orange	73	2	3	Nil	51	19	2	75=75
3	Green	86	Nil	3+2=5	Nil	6	41	34	86=86
Final Categorization		244	13	15	**60 (Red)**	**83 (Orange)**	**63 (Green)**	**36 (White)**	**257 =257** (Total categories including in foot-note)

Table G-2 : Final List of Red Category of Industrial Sectors

Sl No.	Orgnl Sl.No	Industry Sector	W1	W2	W	A1	A2	A	H	W+A+H	Revised Category	REMARKS
1.	38	Isolated storage of hazardous chemicals (as per schedule of manufacturing, storage of hazardous chemicals rules ,1989 as amended)									R-R	As per provisions of Rules, to be kept under Red category especially for safety purposes.
2.	4	Automobile Manufacturing (integrated facilities)	30	-	30	20	-	20	10	60	**R-R**	i. Such types of plants are having either one or combinations of polluting activities viz. washing, metal surface finishing operations, pickling, plating, electro-plating , phosphating, painting , heat treatment etc. ii. Some of such plants may outsource some /all of the polluting activities. In such cases, after thorough inspection of such units by concerned SPCB, re-categorization of the industry shall be made accordingly.
3.	34	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely - Spent cleared metal catalyst containing copper,, Spent cleared metal catalyst containing zinc,,	30	-	30	20	-	20	10	60	**R-R**	All the three types of pollutants are expected.
4.	44	Manufacturing of lubricating oils ,grease and petroleum based products	20	-	20	20	-	20	20	60	**R-R**	Generates all sorts of pollution.
5.	66 E	DG Set of capacity > 5 MVA	-	-	-	20	5	25	-	62.5	**R-R**	i. Mainly air polluting. ii. DG sets consume the diesel @ 0.21 litres/hr/KVA at full load. iii. Average running is taken @ 12 hrs / day although many of the DG sets run for more than this period.
6.	31	Industrial carbon including electrodes and graphite blocks, activated carbon, carbon black	10	-	-	20	5	25	10	62.5	**R-R**	Mainly air polluting. Air pollution score is normalized to 100.

7.	39	Lead acid battery manufacturing(excluding assembling and charging of lead-acid battery in micro scale)	10	-	10	25	-	25	10	62.5	**R-R**	i. Mainly air polluting. Air pollution scores are normalized to 100. ii. Lead Acid Battery manufacturing consists of various stages which broadly involve (after producing or receiving lead oxide): Paste Mixing , Grid Casting , Grid Pasting & Curing , Hydro-setting, parting & enveloping , Stacking, grouping & inter-cell welding , Formation. iii. Exposure of workmen to lead during all or any of the processes outlined above exceeds the prescribed standards if appropriate equipment in this respect is not installed at any Battery Manufacturing Unit. iv. All of the above processes, some more than others, involve release of lead particles or fumes into the environment. Pollution from the above processes can be grouped into two possible types, viz: (a) Lead Oxide becomes airborne and there is Particulate Pollution (b) Fumes are generated and there is Gaseous Pollution
8.	62	Phosphate rock processing plant	30	-	30	20	-	20	-	62.5	**R-R**	i. The separation of phosphate rock from impurities and non-phosphate materials for use in fertilizer manufacture consists of beneficiation, drying or calcining at some operations, and grinding. Phosphate rock from the mines is first sent to beneficiation units to separate sand and clay and to remove impurities. Steps used in beneficiation depend on the type of rock. ii. The water & air pollution scores are normalized to 100.

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9.	66	Power generation plant [except Wind and Solar renewable power plants of all capacities and Mini Hydel power plant of capacity <25MW]	10	-	10	15	10	25		62.5	**R-R**	1. Mainly air polluting. It uses a mixture of biomass (agro based) and coal (< 10 %) as a fuel. Almost, round the year operation. 2 . In case of DG sets of 5 MVA & more and emissions of SO2 will take place due to use of liquid fuel. Air pollution score will be =20 + 10 = 30, Normalized score will be 75. 3. In case of 'Waste to Energy Plants' , water will be used for cooling and air score will be - 30+10 = 40.
10.	34	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely - Spent catalyst containing nickel, cadmium, Zinc, copper, arsenic, vanadium and cobalt,	30	-	30	25	-	25	10	65	**R-R**	All the three types of pollutants are expected.
11.	67	Processes involving chlorinated hydrocarbons	30	-	30	20	-	20	15	65	**R-R**	Chlorinated hydrocarbons are used in the manufacture of insecticides, pesticides and organo chloro pesticides. Effluents & emissions are toxic in nature.
12.	74	Sugar (excluding Khandsari)	20	10	30	15	10	25	10	65	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Sugar mills generate all sorts of pollution problems.
13.	22	Fibre glass production and processing (excluding moulding)	-	-	-	20	-	20	20	67	**R-R**	i. The use of styrene in most methods of fiberglass production causes hazardous air pollution that is harmful to breathe at excessive levels. ii. It is mainly air polluting & HW generating industry. The air pollution & HW scores are normalized to 100. iii. In case of lead containing glass, the score of A1 will be 25 and final normalized score will be 75 and shall be categorized as Red.
14.	23	Fire crackers manufacturing and bulk storage facilities	-	-	-	20	-	20	20	67	**R-R**	i. This is the normalized score based on air pollution & HW generation. ii. Various hazardous chemicals are used in the manufacturing process. iii. These chemicals are namely Potassium Nitrate , Potassium per-chlorate, Barium Nitrate, Aluminium compounds, Copper Chloride etc.

												iv. These chemicals are highly hazardous and cause serious diseases among the workers. especially ability of blood to carry oxygen leading to headaches, methemoglobinemia and kidney problems , skin problems, thyroid metal fume etc.
15.	34	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely - Dismantlers Recycling Plants -- Components of waste electrical and electronic assembles comprising accumulators and other batteries included on list A, mercury-switches, activated glass cullets from cathode-ray tubes and other activated glass and PCB-capacitors, or any other component contaminated with Schedule 2 constituents (e.g. cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they exhibit hazard characteristics indicated in part C of this Schedule.	-	-	-	30	0	30	10	67	R-R	Mainly air polluting and hazardous waste generating. Air & HW pollution scores are jointly normalized to 100.
16.	47	Milk processes and dairy products(integrated project)	20	10	30	20	5	25	-	68.75	**R-R**	i. Water as well as air polluting due to use of boilers. ii. Water & air pollution scores are normalized to 100.
17.	63	Phosphorous and its compounds	30	-	30	25	-	25	-	68.75	**R-R**	Water pollution & air pollution containing compounds of phosphorous are expected
18.	61	Pulp & Paper (waste paper based without bleaching process to manufacture Kraft paper)	20	10	30	15	10	25	0	68.75	**R-R**	Mainly water & air polluting . Water & air pollution scores are normalized to 100.
19.	13	Coke making , liquefaction, coal tar distillation or fuel gas making	30	-	30	20	-	20	20	70	**R-R**	It is a kind of petrochemical industry.

20.	41	Manufacturing of explosives, detonators, fuses including management and handling activities	30	-	30	20	-	20	20	70	**R-R**	i. Explosives manufacture and use contribute some measure of hazardous waste to the environment. ii. Nitroglycerin produces several toxic byproducts such as acids, caustics, and oils contaminated with heavy metals. These must be disposed of properly by neutralization or stabilization and transported to a hazardous waste landfill. iii. The use of explosives creates large amounts of dust and particulate from the explosion, and, in some cases, releases asbestos, **lead,** and other hazardous materials into the atmosphere.
21.	45	Manufacturing of paints varnishes, pigments and intermediate (excluding blending/mixing)	30	-	30	25	-	25	15	70	**R-R**	i. The process may cause considerable emissions of volatile organic compounds (VOC). VOC contribute to the creation of ozone in the lower layers of the atmosphere (photochemical air pollution) and can present danger to health. ii. Dust and odour may also be a problem. iii. Washing of vessels will contribute waste-waters. iv. Large quantity of HWs are also produced.
22.	56	Organic Chemicals manufacturing	30	-	30	20	-	50	20	70	**R-R**	Such types of industrial sectors generate all sorts of pollution.
23.	1	Airports and Commercial Air Strips	20	10	30	-	-	-	10	75	**R-R**	i. The Airports are generating mainly the waste-waters. ii. This is the water pollution normalized score for airports having discharge more than 100 KLD. iii. The airports / strips having discharge less than 100 KLD will have score of 50 and hence orange category. iv. If the score is normalized wrt water + HW both, then all the airports will come under Orange category (score - 58.33).
24.	3	Asbestos and asbestos based industries	-	-	-	30	-	30	10	75	**R-R**	i. This is mainly air polluting industry. ii. Final score is based on air pollution score only. iii. Asbestos is carcinogenic and banned in many countries.
25.	5	Basic chemicals and electro chemicals and its derivatives including manufacturing of acid	30	-	30	-	-	-	10	75	**R-R**	i. Standards prescribed for Inorganic Chemicals are adopted. ii. It is mainly water polluting industry having effluents which are toxic and not easily biodegradable.

												iii. Water pollution score normalized to 100 is undertaken. iv. The earlier Red category industrial sector namely "Hydrocyanic acid and its derivatives " is also merged under this industrial sector.
26.	7	Cement	-	-	-	20	10	30	-	75	**R-R**	This is mainly air polluting industry & hence normalized air pollution score.
27.	9	Chlorates, per-chlorates & peroxides	30	-	30	-	-	-	-	75	**R-R**	i. It is mainly water polluting industry having effluents which are toxic and not easily biodegradable. ii. Water pollution score normalized to 100 is undertaken.
28.	10	Chlorine, fluorine, bromine, iodine and their compounds	30	-	30	-	-	-	-	75	**R-R**	i. It is mainly water polluting industry having effluents which are toxic and not easily biodegradable. ii. Water pollution score normalized to 100 is undertaken.
29.	16	Dyes and Dye- Intermediates	30	-	30	20	5	25	20	75	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Such types of industrial sectors generate all sorts of pollution.
30.	26	Health-care Establishment (as defined in BMW Rules)	20	10	30	-	-	-	-	75	**R-R**	i. Mainly water polluting. ii. The water pollution score is normalized to 100 & valid for Hospitals having total waste-water generation > 100 KLD. iii. The hospitals with incinerator will be categorized as Red irrespective of the quantity of the waste-water generation. iv. The hospitals having total waste-water generation less than 100 KLD and without incinerator, the normalized water pollution score will be 50 and will be categorized as Orange category.
31.	29	Hotels having overall waste-water generation @ 100 KLD and more.	20	10	30	15	-	15	-	75	**R-R**	i. Mainly water polluting. Small boiler may be installed. ii. The water pollution score is normalized to 100 & valid for Hotels having waste-water generation > 100 KLD. iii. The hotels having more than 20 rooms and waste-water generation less than 100 KLD and having a coal / oil fired boiler , the pollution score will be 35/40 & are categorized as Orange. iv. The hotels having more than 20 rooms and waste-water generation less than 10 KLD and

												having no-boiler & no hazardous waste generation, the pollution score will be 20 & are categorized as Green.
32.	34	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely - Lead acid battery plates and other lead scrap/ashes/residues not covered under Batteries (Management and Handling) Rules, 2001. [* Battery scrap, namely: Lead battery plates covered by ISRI, Code word "Rails" Battery lugs covered by ISRI, Code word "Rakes". Scrap drained/dry while intact, lead batteries covered by ISRI, Code word "rains".	30	-	30	25	--	25	20	75	**R-R**	All the three types of pollutants are generated.
33.	34	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely - Integrated Recycling Plants -- Components of waste electrical and electronic assembles comprising accumulators and other batteries included on list A, mercury-switches, activated glass cullets from cathode-ray tubes and other activated glass and PCB-capacitors, or any other component contaminated with Schedule 2 constituents (e.g. cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they exhibit hazard characteristics indicated in part C of this Schedule.	30	-	30	25	-	25	20	75	**R-R**	All the three types of pollutants are expected.
34.	43	Manufacturing of glue and gelatin	30	10	40	20	-	20	-	75	**R-R**	Highly water polluting & obnoxious air polluting.
35.	49	Mining and ore beneficiation	30	10	40	15	5	20	-	75	**R-R**	Both air and water polluting. Score is normalized with air & water pollution.

36.	52	Nuclear power plant	10	-	10	30	-	30	15	75	**R-R**	i. Mainly air polluting due to incinerator. Others - cooling water. ii. Air pollution score is normalized to 100.
37.	58	Pesticides (technical) (excluding formulation)	30	-	30	25	-	25	20	75	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Such types of industrial sectors generate all sorts of pollution.
38.	64	Photographic film and its chemicals	30	-	30	-	-	-	-	75	**R-R**	i. Silver salts and other chemicals are used in preparation. Slight quantity of effluents is generated. ii. Water pollution scores are normalized to 100.
39.	68	Railway locomotive work shop/Integrated road transport workshop/Authorized service centers	20	10	30	-	-	-	10	75	**R-R**	i. Mainly water polluting industry . Water is used in the washing of locomotives, road transport vehicles during servicing. ii. This score is valid for those Centers having discharge more than 100 KLD. iii. Service Centers having waste-water generation < 100 KLD, the normalized score will be =(100*20)/40= 50.
40.	84	Yarn / Textile processing involving any effluent/emission generating processes including bleaching, dyeing, printing and colouring	30	10	40	15	-	15	20	75	**R-R**	In this sector all sorts of pollution are generated.
41.	8	Chlor Alkali	30	10	40	20	10	30	10	80	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Chlor-alkali units are having different section like NaOH, Cl2, SBP etc which are having toxic effluents. Additionally , fuel consumption is also on higher-side.
42.	70	Ship Breaking Industries	30	-	30	30	-	30	20	80	**R-R**	i. The ship-breaking industry creates numerous hazards for the coastal and marine environment. ii. Ship-breaking releases a large number of dangerous pollutants, including toxic waste, oil, poly-chlorinated biphenyls, and heavy metals, into the waters and sea bed. iii. While most of the oil is removed before a ship is scrapped, sand used to mop up the remaining oil is thrown into the sea. High concentrations of oil and grease are then found in the coastal waters, choking marine life.

												iv. Solid waste strewn on the shore, 45 tonnes on any given day according to a study by the Central Pollution Control Board, also finds its way into the sea. v. Adding to the stress on coastal waters, the organic load from the thousands of workers living in cramped conditions with little or no sanitary facilities results in unacceptably high levels of BOD.
43.	53	Oil and gas extraction including CBM (offshore & on-shore extraction through drilling wells)	30	-	30	-	-	-	20	83	**R-R**	i. Mainly water polluting & hazardous waste generating. ii. The water pollution & HW generation scores are normalized to 100.
44.	36	Industry or process involving metal surface treatment or process such as pickling/ electroplating/paint stripping/ heat treatment using cyanide bath/ phosphating or finishing and anodizing / enamellings/ galvanizing	30	-	30	-	-	-	20	83	**R-R**	Mainly water polluting & toxic hazardous waste generating industry. Scores are normalized to 100.
45.	80	Tanneries	30	-	30	-	-	-	20	83	**R-R**	Mainly water polluting & hazardous waste generating industry. Scores are normalized to 100.
46.	65	Ports and harbour, jetties and dredging operations	30	10	40	15	10	25	20	85	**R-R**	This category contain all sorts of pollution.
47.	77	Synthetic fibers induding rayon ,tyre cord, polyester filament yarn	30	10	40	25	10	35	10	85	**R-R**	This sector generates all sorts of pollution problems.
48.	81	Thermal Power Plants	30	10	40	20	10	30	15	85	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. TPP generate all sorts of pollution problems.
49.	71	Slaughter house (as per notification S.O.270(E)dated 26.03.2001)and meat processing industries, bone mill, processing of animal horn, hoofs and other body parts	25	10	35	-	-	-	-	87.5	**R-R**	Mainly water polluting and obnoxious odour generating industry. The water pollution score is normalized to 100
50.	2	Aluminium Smelter	30	10	40	20	10	30	20	90	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. This sector is generating all sorts of pollution i.e. air, water and HW.
51.	12	Copper Smelter	30	10	40	20	10	30	20	90	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Integrated Copper Smelters contain all sorts of

												pollution.
52.	20	Fertilizer (basic) (excluding formulation)	30	10	40	20	10	30	20	90	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Generates all sorts of pollution.
53.	37	Iron & Steel (involving processing from ore/ integrated steel plants) and or Sponge Iron units	30	10	40	20	10	30	20	90	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Such types of industrial sectors generate all sorts of pollution.
54.	61	Pulp & Paper (waste paper based units with bleaching process to manufacture writing & printing paper)	25	10	35	25	10	35	20	90	**R-R**	Waste paper based Pulp & Paper mills with bleaching process generate all sorts of pollution.
55.	85	Zinc Smelter	30	10	40	20	10	30	20	90	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Integrated Zinc smelter generates all sorts of pollution problems.
56.	55	Oil Refinery (mineral Oil or Petro Refineries)	30	10	40	25	10	35	20	95	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Such types of industrial sectors generate all sorts of pollution.
57.	59	Petrochemicals Manufacturing (including processing of Emulsions of oil and water)	30	10	40	25	10	35	20	95	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Such types of industrial sectors generate all sorts of pollution. iii. The earlier red category industrial sector namely "Processing of Emulsions of Oil & Water " is merged with this industrial sector.
58.	60	Pharmaceuticals	30	10	40	30	5	35	20	95	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Such types of industrial sectors generate all sorts of pollution.
59.	61	Pulp & Paper (Large-Agro + wood) , Small Pulp & Paper (agro based-wheat straw/rice husk)	30	10	40	25	10	35	20	95	**R-R**	i. This industrial sector is the one among the '17 categories of Highly Polluting Industries'. ii. Large /Small Agro based Pulp & Paper mills contribute all sorts of pollution problems.
60.	15	Distillery (molasses / grain / yeast based)	30	10	40	-	-	-	-	100	**R-R**	Mainly water polluting industry. Final score is the normalized water pollution score.

Note :

i. *Under the column Revised Category, the full forms of the abbreviations are as follows :*
   a. *R-R means original category was Red and revised category is also Red*
   b. *R-O means original category was Red and revised category is Orange*
   c. *O-O means original category was Orange and revised category is also Orange*
   d. *O-G means original category was Orange and revised category is Green*
   e. *O-W means original category was Orange and revised category is White*
   f. *G-O means original category was Green and revised category is Orange*
   g. *G-G means original category was Green and revised category is also Green*
   h. *G-W means original category was Green and revised category is White*

ii. *There are specific remarks in respect of some of the industrial sectors. These sectors are either merged with other relevant sectors or deleted due to duplication. The overall details are as follows :*

Sl No.	Original Sl No.	Industry Sector	Original Category	Remarks
1	14	Common treatment and disposal facilities(CETP, TSDF, E-waste recycling, CBMWTF, effluent conveyance project, incinerator, solvent/acid recovery plant, MSW sanitary land fill site)	R	i. All such facilities are classified as Red but special category projects as these are parts of pollution control facilities. ii. In case of CETP , the categorization will depend upon the category of member industries being served.
2	18	Processing of Emulsions of Oil & Water		It is a part of Petrochemical industries. Transferred and merged with the industrial sector namely 'Petrochemicals' at Sl. No. 54.
3	27	Heavy engineering including ship building (with investment on Plant & Machineries more than Rs 10 crores)	R	Most of the pollution generating processes / operations under this category are similar to the industry category namely "Automobile Manufacturing (integrated facilities)" at Sl . No. 1 and may be referred accordingly.
4	30	Hydrocyanic acid and its derivatives	R	Have been merged with the red category industrial sector namely " Basic chemicals and electro chemicals and its derivatives including manufacturing of acid " at Sl. No. 24
5	32	Industrial estates/ parks / complexes/ areas/ export processing zones/ SEZs/ Biotech parks/ leather complex	R	The classification will depend upon the category(ies) of the industries operating / proposed to be permitted in the area. In this context, guidelines prescribed in EIA Notification, 2006 shall be followed.
6	33	Industrial inorganic gases namely- a) Chemical gas- Acetylene, hydrogen, chlorine, fluorine, ammonia, sulphur dioxide, ethylene, hydrogen-sulphide, phosphine b) Hydrocarbon gases- Methane , ethane, propane	R	These gases are generally secondary products and produced alongwith other main products. To be classified as per the main parent plant.
7	69	Reprocessing of used oils & waste oils	R	i. The industry generates mainly the air pollution and oil bearing hazardous wastes. The normalized (air pollution & HW generation score is 58.33. ii. To be deleted as already covered under HW Recyclers / Re-processors (Used oils / Waste Oils) under Orange Category

Table G-3 : Final List of Orange Category of Industrial Sectors

Final Sl. No.	Orgnl S.No	Industry Sector	W1	W2	W	A1	A2	A	H	W+A+H	Revised category	Remarks
1.	20	Dismantling of rolling stocks (wagons/ coaches)	--	--	--	15	--	15	10	41.67	O-O	Emissions of dust and generation of waste oils take place during dismantling. Air pollution & HW generation scores (15+10=25) are normalized to 100.
2.	5	Bakery and confectionery units with production capacity > 1 TPD. (With ovens / furnaces)	20	--	20	15	--	15	--	43.75	O-O	
3.	10	Chanachur and ladoo from puffed and beaten rice(muri and shira) using husk fired oven	20	--	20	15	--	15	--	43.75	O-O	Normal water and air polluting.
4.	23	Coated electrode manufacturing	15	0	15	20	0	20	0	43.75	**G-O**	Preparation of core wire / rod, preparation of dry mix, preparation of wet mix, application of coating by extrusion, baking of coated electrodes
5.	24	Compact disc computer floppy and cassette manufacturing / Reel manufacturing	15	0	15	20	0	20	0	43.75	**G-O**	Generates waste-water and process emissions.
6.	24	Flakes from rejected PET bottle	20	-	20	15	-	15	-	43.75	R-O	Normal water & air pollutions are generated.
7.	30	Food and food processing including fruits and vegetable processing	20	--	20	15	--	15	--	43.75	O-O	Normal water and air polluting.
8.	40	Jute processing without dyeing	20	--	20	15	--	15	--	43.75	O-O	CPCB has notified standards for this category. Both air and water pollutions are generated.
9.	56	Manufacturing of silica gel	15	0	15	20	0	20	0	43.75	**G-O**	Waste-waters containing TDS and emissions of H_2SO_4 are generated.

10.	45	Manufacturing of tooth powder, toothpaste, talcum powder and other cosmetic items	20	--	20	15	--	15	--	43.75	O-O	Both air and water pollution are generated.
11.	55	Printing or etching of glass sheet using hydrofluoric acid	15	--	15	20	--	20	--	43.75	O-O	Both air and water pollution are generated.
12.	65	Silk screen printing, sari printing by wooden blocks	20	--	20	15	--	15	--	43.75	O-O	Wash-water and PM emissions from boilers .
13.	76	Synthetic detergents and soaps(excluding formulation)	20	-	20	15	-	15	-	43.75	R-O	i. This is the score for units having generation of waste-waters less than 100 KLD. ii. The units having waste-water generation more than 100 KLD will become mainly water polluting and accordingly normalized water pollution score will be 75 and be categorized as Red.
14.	71	Thermometer manufacturing	15	--	15	20	--	20	--	43.75	O-O	Process - making glass bulb, forming reservoir in the glass tube for fluid, inserting fluid, scale marking. Use of fuel to heat the glass tubes and hydrofluoric acid to seal the scaling. Small quantities of spent acids are generated.
15.	14	Cotton spinning and weaving (medium and large scale)	--	--	--	15	--	37.5	10	47.5	O-O	Mainly air polluting industry. Sources of air pollution (PM) are the fine particles of cotton from spinning process. Air pollution score is normalized to 100.
16.	1	Almirah, Grill Manufacturing (Dry Mechanical Process)	--	--	--	20	--	20	--	50	O-O	Air pollution due to spray painting (emissions of VOCs). Units without painting operations shall be categorized as White.

17.	2	Aluminium & copper extraction from scrap using oil fired furnace (dry process only)	--	--	--	20	--	20	10	50	O-O	i. Normalized Air pollution score. ii. Significant air pollution due to melting (emissions of SO2, PM).
18.	3	Automobile servicing, repairing and painting (excluding only fuel dispensing)	20	--	20	20	--	20	10	50	O-O	Normal water & air polluting and recyclable waste oil generating. If the waste water generation is more than 100 KLD, it will become mainly water polluting and Red category unit.
19.	4	Ayurvedic and homeopathic medicine	20	--	20	15	--	15	15	50	O-O	
20.	7	Brickfields (excluding fly ash brick manufacturing using lime process)	--	--	--	20	--	20	--	50	O-O	Significantly air polluting.
21.	8	Building and construction project more than 20,000 sq. m built up area	20	--	20	20	--	20	--	50	O-O	1. In the pre-construction stage , it is mainly air polluting due to generation of dust (PM) emissions. 2. After construction, it is mainly water polluting. If the discharge is more than 100 KLD, it will be having the normalized score of 75 and be categorized as Red.
22.	6	Ceramics and Refractories	-	-	-	20	-	20	-	50	R-O	i. Mainly air polluting industry. ii. This score is for the units having coal consumption < than 12 MT/day. iii. For the units having coal consumption > 12 MT /day, the normalized air pollution score will be 62.5 and shall be categorized as Red.

23.	11	Coal washeries	15	10	25	15	-	15	-	50	R-O	i. Wet washeries are mainly water polluting industry generating effluents which are having inorganic SS & TDS. Additionally, air pollution due to PM emissions is also generated. ii. Water & air pollution scores are jointly normalized to 100.
24.	16	Dairy and dairy products (small scale)	20	--	20	20	--	20	--	50	O-O	Water and air polluting both.
25.	18	DG set of capacity >1MVA but < 5MVA	--	--	--	20	--	20	--	50	O-O	Mainly air polluting . air pollution score is normalized to 100.
26.	17	Dry coal processing, mineral processing, industries involving ore sintering, pelletisating, grinding & pulverization	-	-	-	20	-	20	-	50	R-O	Mainly air polluting industry. Final score is the normalized air pollution score.
27.	19	Fermentation industry including manufacture of yeast, beer, distillation of alcohol (Extra Neutral Alcohol)	20	-	20	-	-	-	-	50	R-O	i. Mainly water polluting industry. This is the normalized water pollution score for units having discharge < 100 KLD. ii. For the units having discharge > 100 KLD, the normalized water pollution score will be 75 and shall be accordingly categorized as Red.
28.	21	Ferrous and Non- ferrous metal extraction involving different furnaces through melting, refining, re-processing, casting and alloy-making	-	-	-	15	5	20	10	50	R-O	i. Mainly air polluting. ii. This score is applicable to secondary production of ferrous & non-ferrous metals (excluding lead) up-to 1 MT/hour production.

												iii. For lead, the normalized air pollution score will be = (100*25)/40= 62.5 and is categorized as Red. iv. For Induction Furnace clubbed with AOD furnace – separate calculation shall be made based on the capacity of the furnaces. In such industries, the molten metal from induction furnace is transferred to AOD furnace where other metals like manganese and nickel are added to get the metal of desired constituents. The lime and silicon are also added for reduction of the metal oxides to the base metal. the normalized air pollution score will be = (100*25)/40= 62.5 and is categorized as Red.
29.	26	Fertilizer (granulation / formulation / blending only)	--	--	--	20	--	20	--	50	O-O	Air polluting.
30.	27	Fish feed, poultry feed and cattle feed	--	--	--	20	--	20	--	50	O-O	Obnoxious odour , H2S etc. AP score is normalized to 100
31.	28	Fish processing and packing (excluding chilling of fishes)	20	--	20	--	--	--	--	50	O-O	Mainly water polluting. WP score is normalized to 100.

32.	31	Forging of ferrous and non- ferrous metals (using oil and gas fired furnaces)	--	--	--	20	--	20	--	50	O-O	Heating furnace. Mainly air polluting.
33.	32	Formulation/pelletization of camphor tablets, naphthalene balls from camphor/ naphthalene powders.	--	--	--	20	--	20	--	50	O-O	Mainly air polluting. Emissions of Benzene, HC are expected.
34.	33	Glass ceramics, earthen potteries and tile manufacturing using oil and gas fired kilns, coating on glasses using cerium fluorides and magnesium fluoride etc.	--	--	--	20	--	20	--	50	O-O	Mainly air polluting. Emissions of SO2 are expected.
35.	35	Gravure printing, digital printing on flex, vinyl	20	--	20	20	--	20	10	50	O-O	Waste waters , emissions of VOCs
36.	36	Heat treatment using oil fired furnace (without cyaniding)	--	--	--	20	--	20	--	50	O-O	Mainly air polluting and noise generating. AP Score is normalized to 100.
37.	28	Hot mix plants	-	-	-	20	-	20	-	50	R-O	Mainly air polluting. Air pollution scores are normalized to 100.
38.	37	Hotels (< 3 star) or hotels having > 20 rooms and less than 100 rooms.	20	--	20	20	--	20	--	50	O-O	Mainly water polluting. WP score is normalized to 100.
39.	38	Ice cream	20	--	20	20	--	20	--	50	O-O	Wash-water and boilers / oven for pasteurization.
40.	34	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely - Paint and ink Sludge/residues	-	-	-	20	0	20	0	50	R-O	Mainly air polluting. Air pollution score is normalized to 100
41.	34	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely - Brass Dross ,, Copper Dross,, Copper Oxide Mill Scale,, Copper Reverts, Cake & Residues,, Waste Copper and copper alloys in	10	-	10	20	-	20	10	50	R-O	Mainly air polluting.

		dispersible form,, Slags from copper processing for further processing or refining ,, Insulated Copper Wire,, Scrap/copper with PVC sheathing including ISRI-code material namely "Druid" ,, Jelly filled Copper cables ,, Zinc Dross-Hot dip Galvanizers SLAB,, Zinc Dross-Bottom Dross,, Zinc ash/Skimming arising from galvanizing and die casting operations,, Zinc ash/Skimming/other zinc bearing wastes arising from smelting and refining,, Zinc ash and residues including zinc alloy residues in dispersible from ,,										
42.	35	Industry or processes involving foundry operations	-	-	-	20	-	20	-	50	R-O	i. This score is valid for the foundries having capacity < 5 MT/hr as such units require the coal/coke @ < 500 kg/hr. ii. The units having capacity of 5 MT/hr and more, the coal/coke consumption will be more than 500 kg/hr and the normalized score will be 62.5 and classified accordingly as Red.
43.	40	Lime manufacturing (using lime kiln)	-	-	-	20	-	20	-	50	R-O	Mainly air polluting
44.	41	Liquid floor cleaner, black phenyl, liquid soap, glycerol mono-stearate manufacturing	20	--	20	20	--	20	--	50	O-O	Both air and water pollution are generated.

45.	42	Manufacturing of glass	10	-	-	20	-	20	-	50	R-O	i. Mainly air polluting (melting at 1500ºC and refining . ii. In case of lead glass , the score of A1 will be 25 and accordingly the normalized scores will be 62.5 i.e. Red .
46.	43	Manufacturing of iodized salt from crude/ raw salt	12	--	12	20	--	20	--	50	O-O	Boiling in Evaporators (multiple effect evaporators), centrifuging, iodization with KIO3 mixing . Mainly air polluting. Air pollution score is normalized to 100.
47.	42	Manufacturing of mirror from sheet glass	--	--	--	20	--	20	--	50	O-O	Evaporator & furnace for heating the metal to be applied as reflector on mirror. Mainly air polluting.
48.	44	Manufacturing of mosquito repellent coil	--	--	--	20	--	20	--	50	O-O	Mainly air polluting. Toxic fumes are expected.
49.	46	Manufacturing of Starch/Sago	25	-	25	15	-	15	-	50	R-O	i. Water and air polluting industry. Boiler is used for steam generation. ii. Water & air pollution scores are normalized to 100
50.	46	Mechanized laundry using oil fired boiler	20	--	20	20	--	20	--	50	O-O	Both air and water pollution are generated.
51.	47	Modular wooden furniture from particle board, MDF< swan timber etc, Ceiling tiles/ partition board from saw dust, wood chips etc., and other agricultural waste using synthetic adhesive resin, wooden box making (With boiler)	--	--	--	20	--	20	--	50	O-O	1. Mainly air polluting. Boiler as well as VOCs from use of adhesives. 2. Without boiler, it will be a Green category industry.
52.	50	New highway construction project	-	-	-	20	-	20	-	50	R-O	Mainly air polluting project.

53.	51	Non-alcoholic beverages(soft drink) & bottling of alcohol/non alcoholic products	20	-	20	15	5	20	-	50	R-O	i. Both air and water polluting. Score is normalized with air & water pollution. This score is valid for industries having waste-water generation < 100 KLD. ii. For the units having waste-water generation > 100 KLD the , normalized score would be 62.5 and categorized as Red.
54.	49	Paint blending and mixing (Ball mill)	20	--	20	20	--	20	10	50	O-O	Both air and water pollution are generated.
55.	62	Paints and varnishes (mixing and blending)	20	0	0	20	0	20	0	50	**G-O**	Waste-waters as well as fumes of VOCs due to solvents, pigments, varnishes.
56.	51	Ply-board manufacturing(including Veneer and laminate) with oil fired boiler/ thermic fluid heater(without resin plant)	0	--	0	20	--	20	--	50	O-O	Mainly air polluting because of use of boiler. AP score is normalized to 100
57.	52	Potable alcohol (IMFL) by blending, bottling of alcohol products	20	--	20	--	--	--	--	50	O-O	Mainly water polluting. WP score is normalized to 100.
58.	54	Printing ink manufacturing	20	--	20	20	--	20	--	50	O-O	1. Pigments, binders and solvents are used. 2. Boiler is also used. 3. Emissions of VOCs take place.
59.	70	Printing press	20	0	20	20	0	20	0	50	**G-O**	Colored waste-waters containing dyes and VOC emissions are generated.
60.	59	Reprocessing of waste plastic including PVC	20	--	20	20	--	20	--	50	O-O	Large quantities of wash-water and fugitive emissions are generated.
61.	61	Rolling mill (oil or coal fired) and cold rolling mill	10	--	10	20	--	20	--	50	O-O	Mainly air polluting. Air pollution score is normalized to 100. Others - cooling water and recyclable waste oils etc. are generated.
62.	67	Spray painting, paint baking, paint shipping	--	--	--	20	--	20	10	50	O-O	Mainly air polluting. Emissions of VOCs and HC are generated.

63.	72	Steel and steel products using various furnaces like blast furnace /open hearth furnace/induction furnace/arc furnace/submerged arc furnace /basic oxygen furnace /hot rolling reheated furnace	10	-	10	20	-	20	10	50	R-O	i. Mainly air polluting. In the emissions, oxides of manganese, nickel etc. are also present. ii. Air pollution score is normalized to 100.
64.	73	Stone crushers	-	-	-	20	-	20	-	50	R-O	Mainly air polluting. Air pollution score is normalized to 100.
65.	75	Surgical and medical products including prophylactics and latex	20	-	20	20	-	20	-	50	R-O	Both air as well as water polluting. Air and water pollution scores are normalized to 100.
66.	85	Tephlon based products	0	0	0	20	0	20	0	50	**G-O**	Due to spraying applications, emissions (HC) are generated
67.	70	Thermocol manufacturing (with boiler)	--	--	--	20	--	20	--	50	O-O	Polystyrene is heated. Mainly air polluting with boiler.
68.	82	Tobacco products including cigarettes and tobacco/opium processes	20	-	20	20	-	20	-	50	R-O	Such industries generate both air as well as water pollution. These scores are normalized to 100.
69.	72	Transformer repairing/ manufacturing (dry process only)	--	--	--	20	--	20	10	50	O-O	Mainly air polluting because of ovens, shot-blasting etc.
70.	73	Tyres and tubes vulcanization/ hot retreating	10	--	10	20	--	20	--	50	O-O	Mainly air polluting . Emissions of PM, VOCs and obnoxious odour are generated.
71.	83	Vegetable oil manufacturing including solvent extraction and refinery /hydrogenated oils	20	-	20	15	5	20	10	50	R-O	i. All sorts of pollution are generated. ii. This score is valid for plants having waste-water generation < 100 KLD. iii. If the waste-water generation is more than 100 KLD, the unit shall be classified as Red.
72.	74	Wire drawing and wire netting	20	--	20	--	--	--	--	50	O-O	Mainly water polluting. WP score is normalized to 100.

73.	21	Dry cell battery (excluding manufacturing of electrodes) and assembling & charging of acid lead battery on micro scale	30	--	30	15	--	15	10	55	O-O	Water and air polluting both.
74.	50	Pharmaceutical formulation and for R & D purpose (For sustained release/ extended release of drugs only and not for commercial purpose)	20	--	20	20	--	20	15	55	O-O	i. All sorts of pollution are generated. ii. R&D activities are to be shifted to Red category.
75.	78	Synthetic resins	20	-	20	20	-	20	15	55	R-O	All sorts of pollution are generated.
76.	79	Synthetic rubber excluding molding	20	-	20	20	-	20	15	55	R-O	i. Most synthetic rubber is created from two materials, styrene and butadiene. Both are currently obtained from petroleum. ii. Process is similar to a part of Petrochemical plants.
77.	9	Cashew nut processing	25	--	25	20	--	20	--	56	O-O	Normal water and air polluting.
78.	12	Coffee seed processing	25	--	25	20	--	20	--	56	O-O	Normal water & air polluting industry.
79.	57	Parboiled Rice Mills	25	-	25	20	-	20	-	56	R-O	i. Rice Mills are generating both air and water pollution. Waste-waters are having high strength in respect of BOD. ii. This is the normalized air & water pollution score for units having waste-water generation < 100 KLD and fuel consumption less than 12 MTD. iii. For units having waste-water generation > 100 KLD or fuel consumption > 12 MTD or both , the unit shall be classified as Red.

80.	29	Foam manufacturing	--	--	--	20	--	20	15	58	O-O	i. Raw material is polyurethane, latex etc. ii. Emissions of VOCs and HAPs. CH3Cl2 and similar compounds as blowing agents. iii. Outdated raw materials and spoiled slots are discarded as HW.
81.	34	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely - Used Oil – As per specifications prescribed from time to time.	10	0	10	20	0	20	15	58.33	R-O	Mainly air polluting and hazardous waste generating industry. Air pollution & HW scores are normalized to 100
82.	34	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely - Waste Oil ---As per specifications prescribed from time to time.	-	-	-	20	0	20	15	58.33	R-O	Mainly air polluting and hazardous waste generating industry. Air pollution & HW scores are normalized to 100.
83.	56	Producer gas plant using conventional up drift coal gasification (linked to rolling mills glass and ceramic industry refectories for dedicated fuel supply)	--	--	--	20	--	20	15	58.33	O-O	Mainly air polluting & tar (HW) generating. SO2, CO, NOx are generated. Tar is the by-product and utilized by other industries in co-processing.

Note :

i. Under the column Revised Category, the full forms of the abbreviations are as follows :

a. R-R means original category was Red and revised category is also Red
b. R-O means original category was Red and revised category is Orange
c. O-O means original category was Orange and revised category is also Orange
d. O-G means original category was Orange and revised category is Green
e. O-W means original category was Orange and revised category is White
f. G-O means original category was Green and revised category is Orange
g. G-G means original category was Green and revised category is also Green
h. G-W means original category was Green and revised category is White

ii. *There are specific remarks in respect of some of the industrial sectors. These sectors are either merged with other relevant sectors or deleted due to duplication / vague category. The overall details are as follows:*

Sl No.	Original Sl No.	Industry Sector	Original Category	Remarks
1	24	Excavation of sand from the river bed (excluding manual excavation)	O	Since such types of activities cause ecological disturbances, the instructions issued by the government from time to time be followed. To be categorized by MoEF&CC.
2	39	Infrastructure Development Project	O	Vast variety of such projects come under such category. This is to be decided by the concerned SPCB in line of EIA Notification , 2006.
3	53	Power press	O	Very vague term hence deleted. Such types of general engineering units have already been covered.

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Table G-4 : Final List of Green Category of Industrial Sectors

Sl. No.	Orgnl Sl. No.	**Industry Sector**	W1	W2	W	A1	A2	A	H	W+A+H	Revised Category	Remarks
1.	2	Aluminium utensils from aluminium circles by pressing only (dry mechanical operation)	--	--	--	10	--	10	--	25	**G-G**	Minor air pollution due to some fugitive PM emissions from buffing operations.
2.	6	Ayurvedic and homeopathic medicines (without boiler)	10	--	10	--	--	--	--	25	**G-G**	Small quantities of waste-waters are generated from washing operations.
3.	8	Bakery /confectionery /sweets products (with production capacity <1tpd (with gas or electrical oven)	10	--	10	--	--	--	--	25	**G-G**	Small quantities of waste-waters are generated from washing operations.
4.	6	Bi-axially oriented PP film along with metalizing operations	10	--	10	--	--	--	--	25	**O-G**	Mainly extrusion process involving Cooling water recirculation
5.	10	Biomass briquettes (sun drying) without using toxic hazardous wastes	--	--	--	10	--	10	--	25	**G-G**	Minor air pollution due to some fugitive PM emissions from pulverization / mixing operations.
6.	13	Blending of melamine resins & different powder, additives by physical mixing	--	--	--	10	--	10	--	25	**G-G**	Minor air pollution due to some fugitive PM emissions from pulverization / mixing operations.
7.	15	Brass and bell metal utensils manufacturing from circles(dry mechanical operation without re-rolling facility)	--	--	--	10	--	10	--	25	**G-G**	Minor air pollution due to some fugitive PM emissions from buffing operations.
8.	16	Candy	10	--	10	10	--	10	--	25	**G-G**	Small quantities of waste-water and minor

												PM emissions are generated.
9.	17	Cardboard or corrugated box and paper products (excluding paper or pulp manufacturing and without using boilers)	--	--	--	10	--	10	--	25	**G-G**	This score is valid with Small gas / electricity operated oven / furnace for making glue.
10.	18	Carpentry & wooden furniture manufacturing (excluding saw mill) with the help of electrical (motorized) machines such as electrical wood planner, steel saw cutting circular blade, etc.	--	--	--	10	--	10	--	25	**G-G**	Minor air pollution due to some fugitive PM emissions from cutting operations.
11.	19	Cement products (without using asbestos / boiler / steam curing) like pipe ,pillar, jafri, well ring, block/tiles etc.(should be done in closed covered shed to control fugitive emissions)	--	--	--	10	--	10	--	25	**G-G**	Minor air pollution due to some fugitive PM emissions from mixing operations.
12.	20	Ceramic colour manufacturing by mixing & blending only (not using boiler and wastewater recycling process)	--	--	--	10	--	10	--	25	**G-G**	Minor air pollution due to some fugitive PM emissions.
13.	11	Chilling plant, cold storage and ice making	10	--	10	--	--	--	--	25	**O-G**	Cooling water recirculation only.
14.	13	Coke briquetting (sun drying)	--	--	--	10	--	10	--	25	**O-G**	Mainly air polluting industry. Sources of air pollution (PM) are pulverizes and mixers. Air pollution score is normalized to 100.
15.	28	Cotton spinning and weaving (small scale)	--	--	--	10	--	10	--	25	**G-G**	Minor PM emissions from spinning process.
16.	17	Dal Mills	--	--	--	10	--	10	--	25	**O-G**	Some fugitive emissions of PM.

17.	29	Decoration of ceramic cups and plates by electric furnace	--	--	--	10	--	10	--	25	**G-G**	Fumes of enamels. Minor air pollution.
18.	19	Digital printing on PVC clothes	--	--	--	10	--	10	--	25	**O-G**	Minor emissions / odour generations are expected.
19.	25	Facility of handling, storage and transportation of food grains in bulk	--	--	--	10	--	10	--	25	**O-G**	Some fugitive emissions of PM during handling of grains.
20.	36	Flour mills (dry process)	--	--	--	10	--	10	--	25	**G-G**	Fugitive dust emissions.
21.	41	Glass , ceramic, earthen potteries, tile and tile manufacturing using electrical kiln or not involving fossil fuel kiln	--	--	--	10	--	10	--	25	**G-G**	Minor fugitive emissions only.
22.	34	Glue from starch (physical mixing) with gas / electrically operated oven /boiler.	--	--	--	10	--	10	--	25	**O-G**	Some fugitive emissions of PM during mixing of raw materials.
23.	42	Gold and silver smithy (purification with acid smelting operation and sulphuric acid polishing operation) (using less or equal to 1 litre of sulphuric acid/ nitric acid per month)	--	--	--	10	--	10	--	25	**G-G**	Minor fumes from cleaning process.
24.	36	Heat treatment with any of the new technology like ultrasound probe , induction hardening , ionization beam, gas carburizing etc.	10	--	10	10	--	10	--	25	**O-G**	• Cooling waters and minor heat fumes. • Finalization of categorization subject to field verification.
25.	46	Insulation and other coated papers (excluding paper or pipe manufacturing)	--	--	--	10	--	10	--	25	**G-G**	Minor fumes due to application of poly-urethane
26.	49	Leather foot wear and leather products (excluding tanning and hide processing except cottage scale)	--	--	--	10	--	10	--	25	**G-G**	Minor fumes due to use of adhesives / gums.

27.	50	Lubricating oil, greases or petroleum based products (only blending at normal temperature)	--	--	--	10	--	10	--	25	**G-G**	Minor fumes at the time of transfers from one container to other.
28.	54	Manufacturing of pasted veneers using gas fired boiler or thermic fluid heater and by sun drying	--	--	--	10	--	10	--	25	**G-G**	1. Minor fumes due to application of gums / adhesives / pastes etc. 2. This score is valid only for gas fired boiler.3. The units having coal fired boilers shall be categorized as Orange.
29.	59	Oil mill Ghani and extraction (no hydrogenation / refining)	10	--	10	--	--	--	--	25	**G-G**	Small quantities of floor washings & equipments washings are generated.
30.	48	Packing materials manufacturing from non asbestos fibre, vegetable fibre yarn	--	--	--	10	--	10	--	25	**O-G**	Some fugitive emissions of PM are expected.
31.	65	Phenyl/toilet cleaner formulation and bottling	--	--	--	10	--	10	--	25	**G-G**	Minor fumes of VOCs in the work zone
32.	67	Polythene and plastic processed products manufacturing (virgin plastic)	10	--	10	10	--	10	--	25	**G-G**	Cooling water & emissions due to mixing of raw materials.
33.	68	Poultry, Hatchery and Piggery	--	--	--	10	--	10	--	25	**G-G**	Obnoxious odour containing H_2S, CH_4 etc. and fugitive PM emissions
34.	69	Power looms (without dye and bleaching)	--	--	--	10	--	10	--	25	**G-G**	Minor emissions of PM.
35.	71	Puffed rice (muri) (using gas or electrical heating system)	--	--	--	10	--	10	--	25	**G-G**	Minor emissions of PM.
36.	57	Pulverization of bamboo and scrap wood	--	--	--	10	--	10	--	25	**O-G**	Some fugitive emissions of PM are expected.
37.	72	Ready mix cement concrete	--	--	--	10	--	10	--	25	**G-G**	PM emissions.
38.	73	Reprocessing of waste cotton	--	--	--	10	--	10	--	25	**G-G**	PM emissions.
39.	60	Rice mill (Rice hullers only)	--	--	--	10	--	10	--	25	**O-G**	PM emissions are generated. Mainly air

												polluting. AP score is normalized to 100
40.	62	Rolling mill (gas fired) and cold rolling mill	10	--	10	10	--	10	--	25	**O-G**	Mainly air polluting. AP score is normalized to 100
41.	75	Rubber goods industry (with gas operated baby boiler)	--	--	--	10	--	10	--	25	**G-G**	Some PM emissions and obnoxious odour.
42.	63	Saw mills	--	--	--	10	--	10	--	25	**O-G**	Mainly air polluting. PM and noise are generated.
43.	77	Soap manufacturing (hand made without steam boiling / boiler)	10	--	10	--	--	--	--	25	**G-G**	Small quantities of waste-water are generated.
44.	80	Spice grinding (upto-20 HP motor)	--	--	--	10	--	10	--	25	**G-G**	Small quantities of fugitive emissions of raw materials.
45.	66	Spice grinding (>20 hp motor)	--	--	--	10	--	10	--	25	**O-G**	Mainly air polluting. Fugitive emissions of PM.
46.	81	Steel furniture without spray painting	--	--	--	10	--	10	--	25	**G-G**	Obnoxious gases from welding as well as noise pollution.
47.	82	Steeping and processing of grains	10	--	10	--	--	--	--	25	**G-G**	Washing waters are generated.
48.	86	Tyres and tube retreating (without boilers)	--	--	--	10	--	10	--	25	**G-G**	Due to applications of binding gum / adhesives / cement, some obnoxious fumes may generate.
49.	22	Chilling plant and ice making without using ammonia	12	--	12	--	--	--	--	30	**G-G**	Cooling water and brine water circuits. Spillages / blow down may take place
50.	26	CO2 recovery	12	--	12	--	--	--	--	30	**G-G**	Normal water pollution from scrubbing action
51.	32	Distilled water (without boiler) with electricity as source of heat	12	--	12	--	--	--	--	30	**G-G**	TDS as distillation residues

52.	45	Hotels (up to 20 rooms and without boilers)	12	--	12	--	--	--	--	30	**G-G**	This score is valid for hotels having overall waste-water generation less than 10 KLD.
53.	53	Manufacturing of optical lenses (using electrical furnace)	12	--	12	--	--	--	--	30	**G-G**	Small quantities of waste-waters containing TDS, SS are generated.
54.	58	Mineralized water	12	--	12	--	--	--	--	30	**G-G**	RO Rejects.
55.	68	Tamarind powder manufacturing	12	--	12	15	--	15	--	33.75	O-G	• Dried tamarind fruits - cleaned and after soaking them in water they are boiled in steam jacketed kettle for about 40-45 minutes. Then pulp is extracted in pulper and dried in drum type drier and on cooling, the final product is packed. • Generates small quantities of waste waters and air emissions. Joint score is normalized to 100.
56.	15	Cutting, sizing and polishing of marble stone	15	--	15	--	--	--	--	37.5	O-G	Mainly water polluting . Water pollution score is normalized to 100.
57.	22	Emery powder (fine dust of sand) manufacturing	--	--	--	15	--	15	--	37.5	O-G	Air polluting. PM emissions take place during various stages of grindings of naturally occurring minerals.
58.	25	Flyash export, transport & disposal facilities	-	-	-	15	-	15	-	37.5	R-G	• This is mainly air polluting activity. • This is the normalized score based on air pollution.
59.	48	Mineral stack yard / Railway sidings	15	-	15	15	-	15	-	37.5	R-G	• Mainly air pollution due to loading, unloading, storage and transportation of the minerals.

												• Waste-water generation mainly during rains only.
60.	54	Oil and gas transportation pipeline	-	-	-	10	5	15	-	37.5	R-G	• Contains small gas based power plants up-to 5 MWs. • Air pollution score is normalized to 100. • In case , if these power plants are bigger / liquid fuel / oil based, scores will be calculated accordingly.
61.	64	Seasoning of wood in steam heated chamber	--	--	--	15	--	15	--	37.5	O-G	Air pollution due to use boiler for supply of steam. Air pollution score is normalized to 100.
62.	84	Synthetic detergent formulation	--	--	--	15	--	15	--	37.5	**G-G**	• This score is valid for the industries which are not manufacturing LABSA. It is procured from outside. • Small quantities of emissions are generated from mini boiler. • Air pollution score is normalized to 100.
63.	69	Tea processing (with boiler)	--	--	--	15	--	15	--	37.5	O-G	With boiler, it is an orange category industry. Without boiler, it will be green category industry.

Note :

i. *Under the column Revised Category, the full forms of the abbreviations are as follows :*
   a. *R-R means original category was Red and revised category is also Red*
   b. *R-O means original category was Red and revised category is Orange*
   c. *O-O means original category was Orange and revised category is also Orange*
   d. *O-G means original category was Orange and revised category is Green*
   e. *O-W means original category was Orange and revised category is White*
   f. *G-O means original category was Green and revised category is Orange*
   g. *G-G means original category was Green and revised category is also Green*
   h. *G-W means original category was Green and revised category is White*

ii. *There are specific remarks in respect of some of the industrial sectors. These sectors are either merged with other relevant sectors or deleted due to duplication. The overall details are as follows :*

Sl No.	Original Sl No.	Industry Sector	Original Category	Remarks
1	47	Jobbing and Machining	G	Vague category to be deleted, as such activities have already been covered in other categories.
2	66	Reel manufacturing	G	Already covered in other categories. Hence, deleted
3	1	Assembling of acid lead batteries (up to 10 batteries per day excluding lead plate casting)	G	Already covered in Orange category. Hence, deleted
4	5	Automobile fuel outlets (only dispensing)	G	Minor air pollution due to some fugitive emissions during fuel filling operations. May be exempted from the purview of Consent management.
5	30	Diesel generator sets (15 KVA to 1 MVA)	G	• Normal operation – 12 hrs a day. • Consumption of diesel = 1680 litres for 1 MVA DG set at full load @ 0.21 litres / KVA / hr. • Stand-alone DG Sets having total capacity 1 MVA or less and equipped with acoustic enclosures alongwith adequate stack height may be exempted from the purview of Consent management. Higher capacity DG sets have already been covered under Red / Orange categories .

Table G-5: Final List of White Category of Industries

Sl. No.	Orgnl Sl. No.	**Industry Sector**	W1	W2	W	A1	A2	A	H	W+A+H	Revised Category
1.	3	Assembly of air coolers /conditioners ,repairing and servicing	--	--	--	--	--	--	--	--	**G-W**
2.	4	Assembly of bicycles ,baby carriages and other small non motorizing vehicles	--	--	--	--	--	--	--	--	**G-W**
3.	7	Bailing (hydraulic press)of waste papers	--	--	--	--	--	--	--	--	**G-W**
4.	9	Bio fertilizer and bio-pesticides without using inorganic chemicals	--	--	--	--	--	--	--	--	**G-W**
5.	11	Biscuits trays etc from rolled PVC sheet (using automatic vacuum forming machines)	--	--	--	--	--	--	--	--	**G-W**
6.	12	Blending and packing of tea	--	--	--	--	--	--	--	--	**G-W**
7.	14	Block making of printing without foundry (excluding wooden block making)	--	--	--	--	--	--	--	--	**G-W**
8.	21	Chalk making from plaster of Paris (only casting without boilers etc. (sun drying / electrical oven)	--	--	--	--	--	--	--	--	**G-W**
9.	25	Compressed oxygen gas from crude liquid oxygen (without use of any solvents and by maintaining pressure & temperature only for separation of other gases)	--	--	--	--	--	--	--	--	**G-W**
10.	27	Cotton and woolen hosiers making (Dry process only without any dying / washing operation)	--	--	--	--	--	--	--	--	**G-W**
11.	31	Diesel pump repairing and servicing (complete mechanical dry process)	--	--	--	--	--	--	--	--	**G-W**
12.	33	Electric lamp (bulb) and CFL manufacturing by assembling only	--	--	--	--	--	--	--	--	**G-W**

13.	34	Electrical and electronic item assembling (completely dry process)	--	--	--	--	--	--	--	--	**G-W**
14.	23	Engineering and fabrication units (dry process without any heat treatment / metal surface finishing operations / painting)	--	--	--	--	--	--	--	--	**O-W**
15.	35	Flavoured betel nuts production/ grinding (completely dry mechanical operations)	--	--	--	--	--	--	--	--	**G-W**
16.	37	Fly ash bricks/ block manufacturing	--	--	--	--	--	--	--	--	**G-W**
17.	38	Fountain pen manufacturing by assembling only	--	--	--	--	--	--	--	--	**G-W**
18.	39	Glass ampules and vials making from glass tubes	--	--	--	--	--	--	--	--	**G-W**
19.	40	Glass putty and sealant (by mixing with machine only)	--	--	--	--	--	--	--	--	**G-W**
20.	43	Ground nut decorticating	--	--	--	--	--	--	--	--	**G-W**
21.	44	Handloom/ carpet weaving (without dying and bleaching operation)	--	--	--	--	--	--	--	--	**G-W**
22.	48	Leather cutting and stitching (more than 10 machine and using motor)	--	--	--	--	--	--	--	--	**G-W**
23.	51	Manufacturing of coir items from coconut husks	--	--	--	--	--	--	--	--	**G-W**
24.	52	Manufacturing of metal caps containers etc	--	--	--	--	--	--	--	--	**G-W**
25.	55	Manufacturing of shoe brush and wire brush	--	--	--	--	--	--	--	--	**G-W**
26.	57	Medical oxygen	--	--	--	--	--	--	--	--	**G-W**
27.	60	Organic and inorganic nutrients (by physical mixing)	--	--	--	--	--	--	--	--	**G-W**
28.	61	Organic manure (manual mixing)	--	--	--	--	--	--	--	--	**G-W**
29.	63	Packing of powdered milk	--	--	--	--	--	--	--	--	**G-W**
30.	64	Paper pins and u clips	--	--	--	--	--	--	--	--	**G-W**
31.	58	Repairing of electric motors and generators (dry mechanical process)	--	--	--	--	--	--	--	--	**O-W**
32.	74	Rope (plastic and cotton)	--	--	--	--	--	--	--	--	**G-W**

33.	76	Scientific and mathematical instrument manufacturing	--	--	--	--	--	--	--	--	**G-W**
34.	78	Solar module non conventional energy apparatus manufacturing unit	--	--	--	--	--	--	--	--	**G-W**
35.	79	Solar power generation through solar photovoltaic cell, wind power and mini hydel power (less than 25 MW)	--	--	--	--	--	--	--	--	**G-W**
36.	83	Surgical and medical products assembling only (not involving effluent / emission generating processes)	--	--	--	--	--	--	--	--	**G-W**

Note : Under the column Revised Category, the full forms of the abbreviations are as follows :

a. *R-R means original category was Red and revised category is also Red*
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c. *O-O means original category was Orange and revised category is also Orange*
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Annexure

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
(पर्यावरण एवं वन मंत्रालय, भारत सरकार)
(MINISTRY OF ENVIRONMENT & FORESTS, GOVT. OF INDIA)

No. B-29012/ESS/CPA/2015-16

19.08.2015

Sub: "Harmonization of Classification of industries under Red / Orange / Green / White Categories".

During the Conference of the Environment Ministers of States held in New Delhi during April 06-07, 2015, it was resolved to adopt pollution potential criteria for categorization of Red, Orange & Green categories of industries and that a Committee be constituted with State representatives. Further, in the 59th Conference of Chairmen & Member Secretaries of Pollution Control Boards/PCCs held in New Delhi on April 08, 2015, it was agreed to constitute a Committee to look into categorization system of industries based on their respective pollution potential index.

2. Accordingly, a Committee comprising the Chairmen of CPCB, APPCB, TNPCB, MPPCB, MPCB, PPCB, WBPCB and MS, CPCB was constituted vide CPCB OM dated 23.04.2015 to review & classify industrial sectors into different categories based on criteria of respective pollution potential indices.

3. The existing Red (85 sectors) , Orange (73 sectors) and Green (86 sectors) industrial sectors have been assessed as per the proposed formula by a group of Scientists from CPCB . For this purpose , concerned Engineers / Scientists from the Member SPCBs of the Committee were also involved & consulted during May28-29, 2015.

4. After careful examination and consideration of the suggestions of concerned stake-holders the "Draft Document on Revised Concept of Categorization of Industrial Sectors " is prepared by the Committee .

In this context, the Undersigned is directed to forward a copy of the " Draft Document on Revised Concept of Categorization of Industrial Sectors to all the SPCBs, PCCs and concerned Ministries for their comments. Accordingly, the same is enclosed herewith and all the SPCBs, PCCs and concerned Ministries are, hereby requested to provide their comments by 04.09.2015. The comments may kindly be sent through hard copy as well as soft copy at e-mail: nkgupta.cpcb@nic.in , nkgcpcb@hotmail.com .

Encl : As above

[N.K. Gupta]
Incharge - ESS

To:

1. All the State Pollution Control Boards / Pollution Control Committees
2. The Secretary, Ministry of Micro Small and Medium Enterprises, New Delhi
3. The Secretary, Ministry of Heavy Industries & Public Enterprises, New Delhi
4. The Advisor & Incharge , CP Division, MoEFCC, New Delhi
5. CPCB Website

'परिवेश भवन' पूर्वी अर्जुन नगर, दिल्ली–110032
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ई–मेल / e-mail :cpcb@nic.in वेबसाईट / Website : www.cpcb.nic.in

Annexure- III

Inventorization of Railway Sidings and Guidelines for their Environment Management

March 2015

CENTRAL POLLUTION CONTROL BOARD

(Ministry of Environment & Forest)

website : cpcb.nic.in ; email : cpcb@nic.in

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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FIGURES

ANNEXURES

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

Sl		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

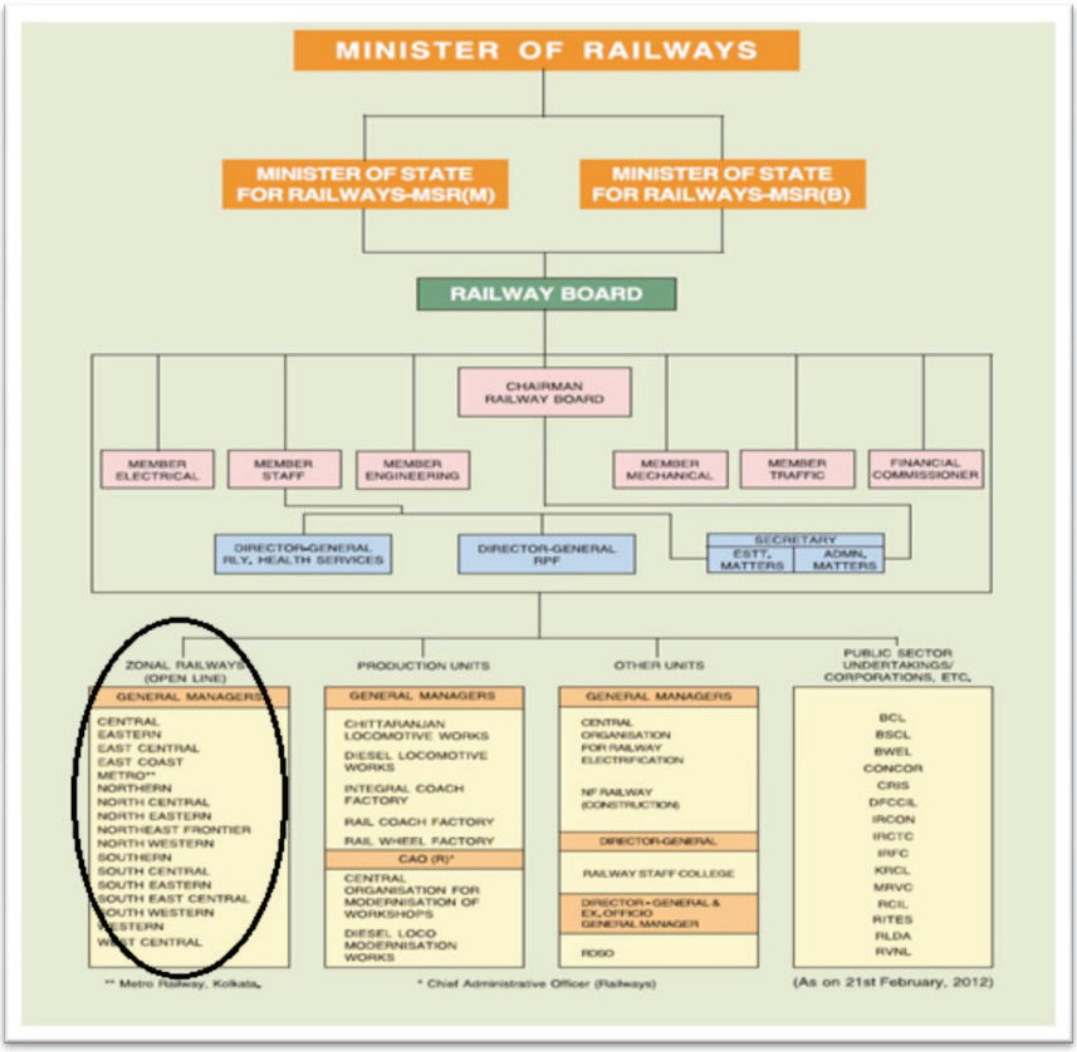


Table 2.1: List of Zones and Division with Headquarter in Indian Railway

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

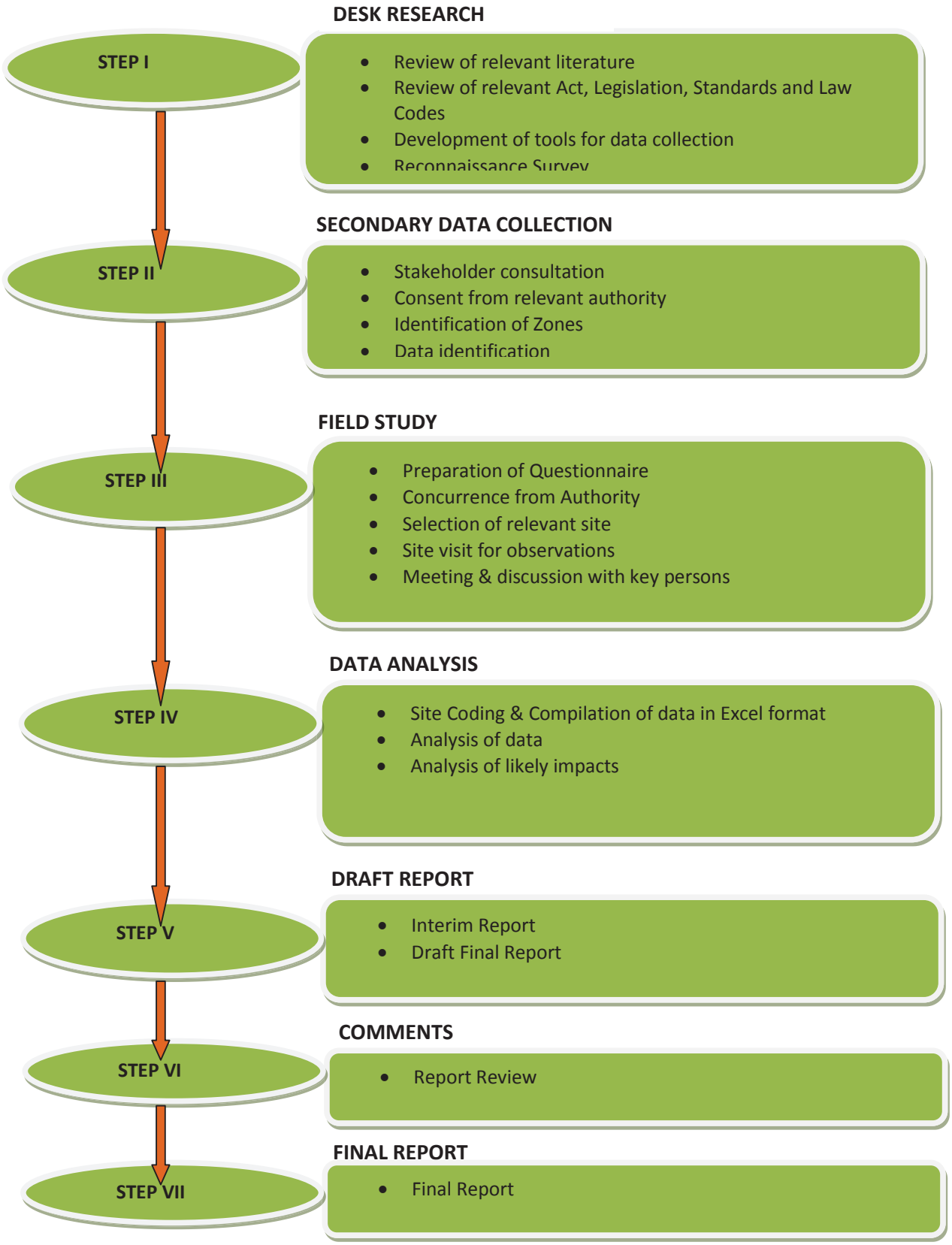
Inventorization of railway siding was a time taking and effort oriented task as huge numbers of sidings are operational in India. Various literature and reports were studied/reviewed to understand the concept and process involved to loading & unloading operation at railway siding. The pollution intensive 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**

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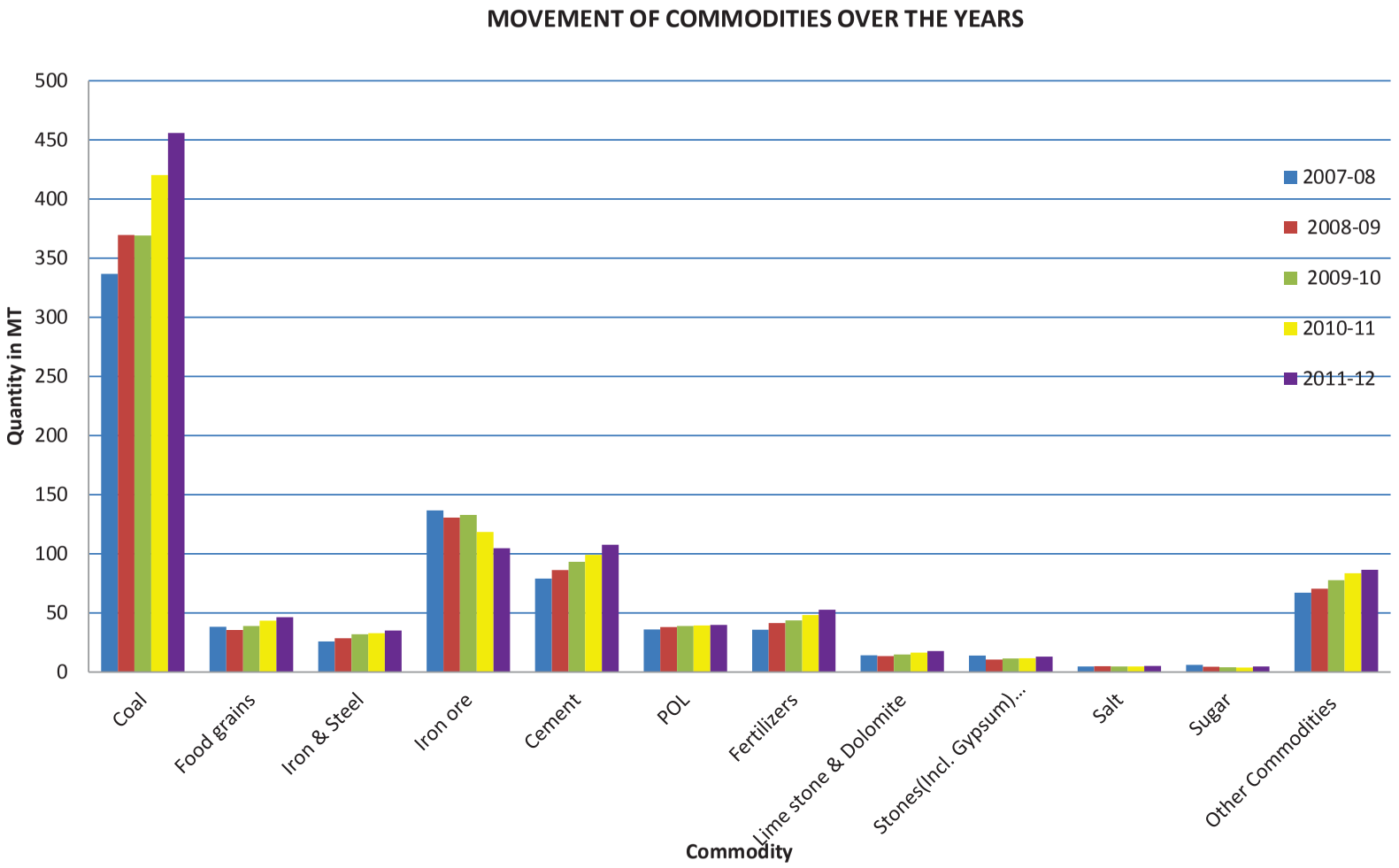
[3] Annual Statistical Statements 2010-11, http://www.indianrailways.gov.in


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

578

FIGURE 3.2
ZONEWISE MOVEMENT OF COAL

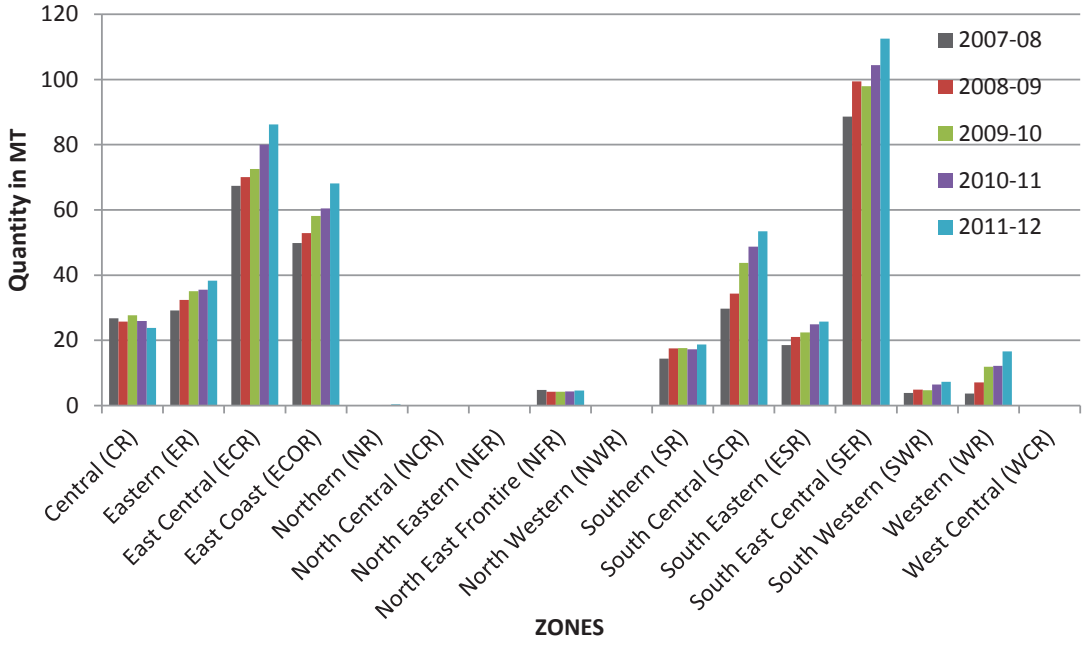


FIGURE 3.3
ZONEWISE MOVEMENT OF IRON ORE

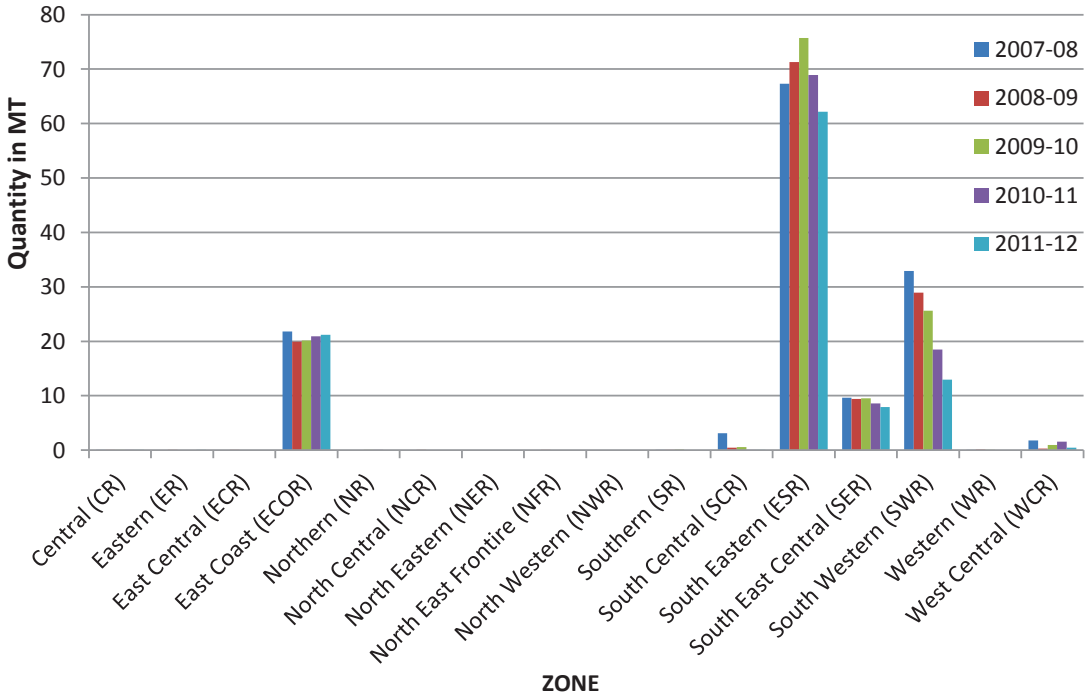
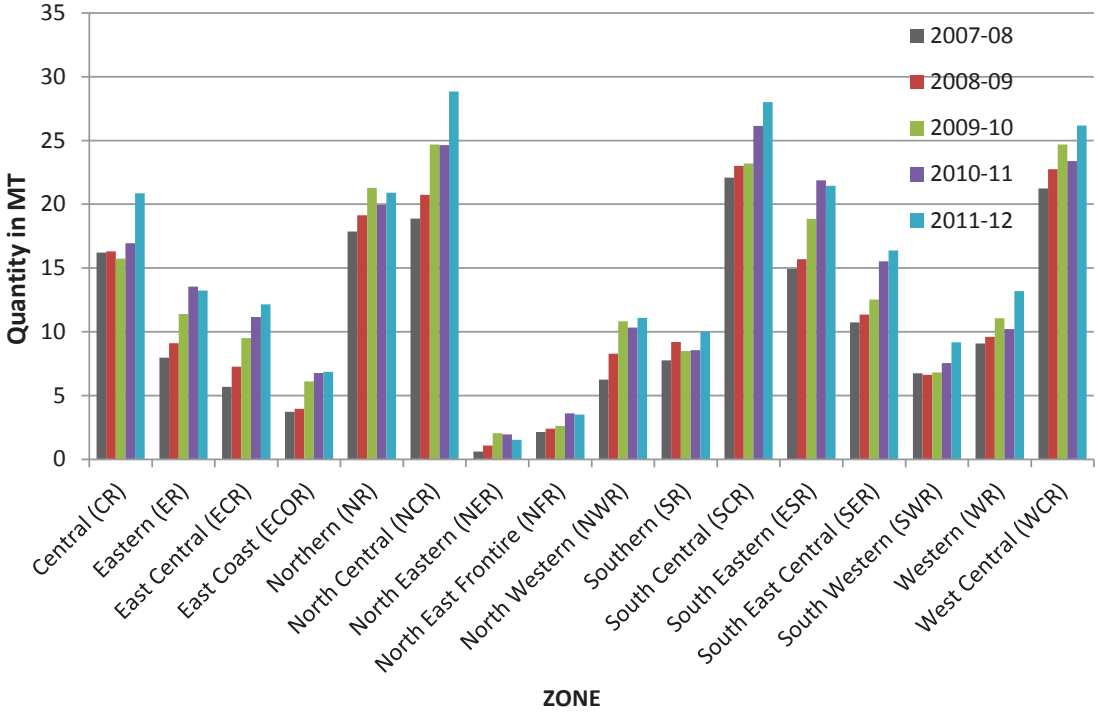


FIGURE 3.4
ZONEWISE MOVEMENT OF CEMENT



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.

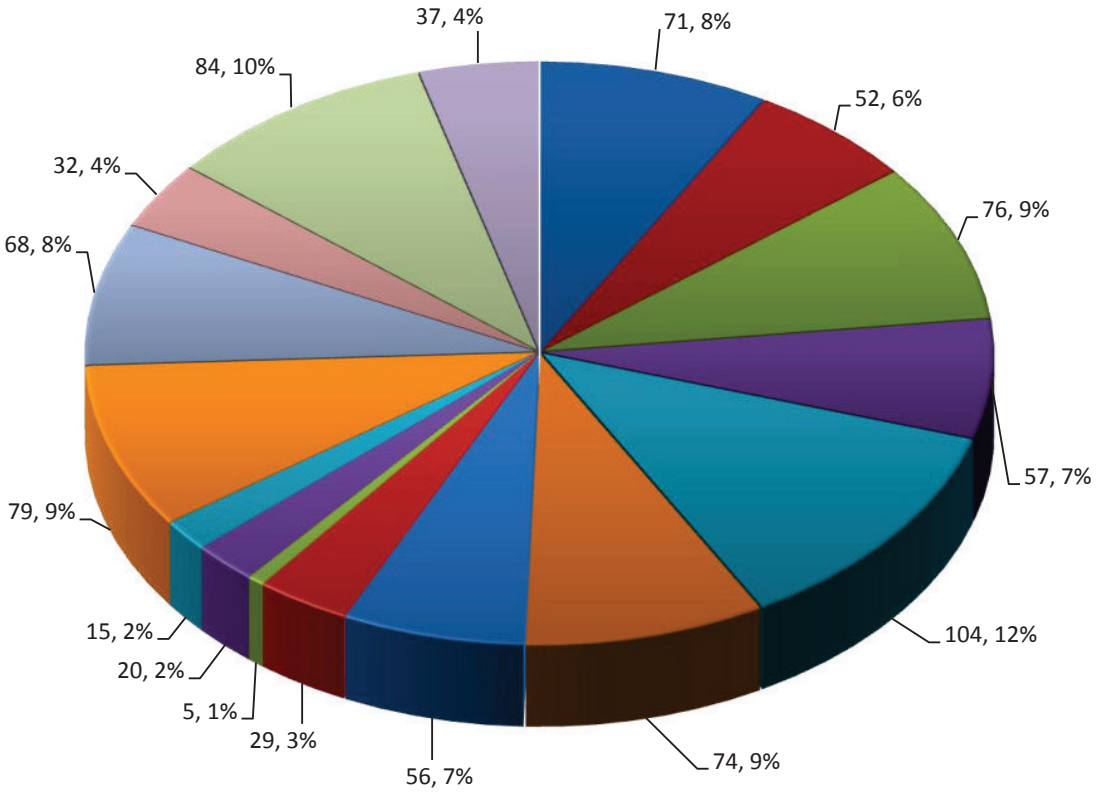
3.4.1 Zone wise sidings

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

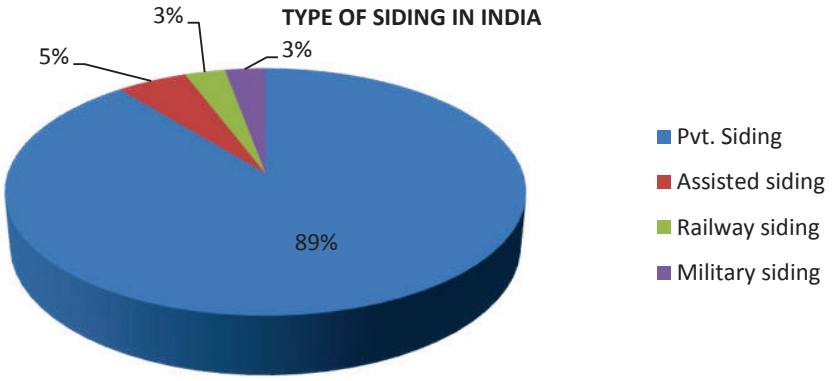


It was observed, that Northern Railway Zone is having maximum number of sidings followed by South East Central Railway Zone. The lowest numbers of siding were observed in North Eastern Zone.

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**.

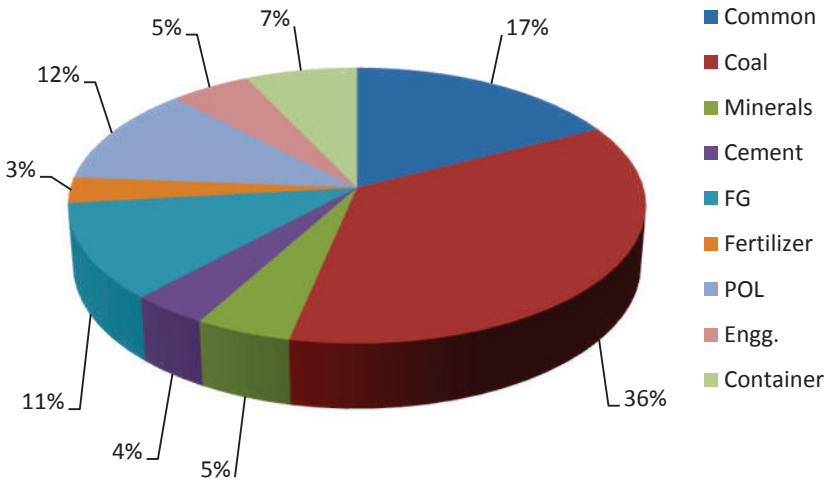
FIGURE 3.6
TYPE OF SIDING IN INDIA



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.

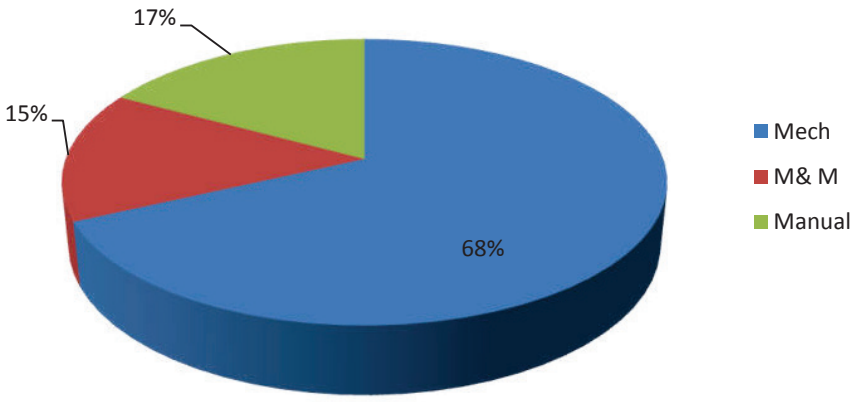
FIGURE 3.7
COMMODITIES HANDLED AT SIDINGS



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

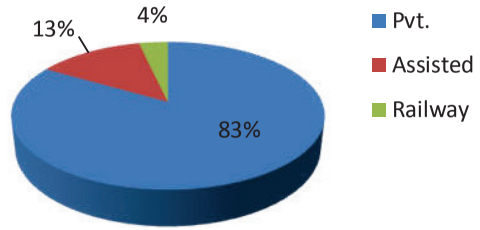


FIGURE 3.10
TYPE OF COMMODITY AT SECR ZONE

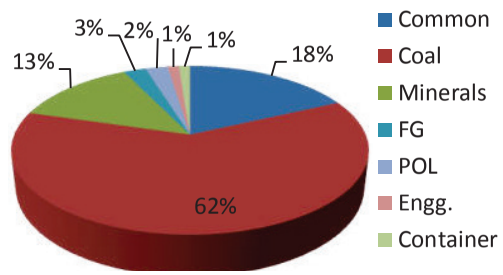
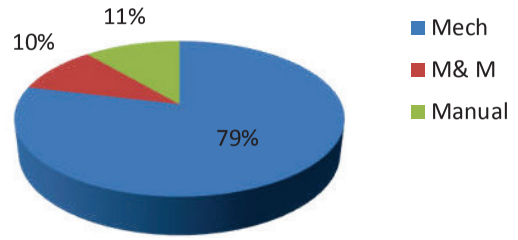


FIGURE 3.11
MODE OF HANDLING AT SECR ZONE



East Central Railway (ECR):

FIGURE 3.12
TYPE OF SIDING AT ECR ZONE

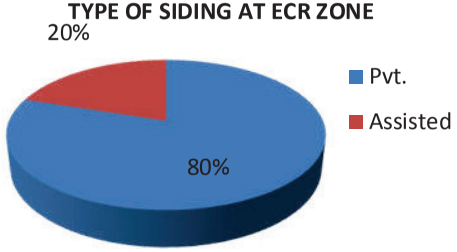


FIGURE 3.13
TYPE OF COMMODITY AT ECR ZONE

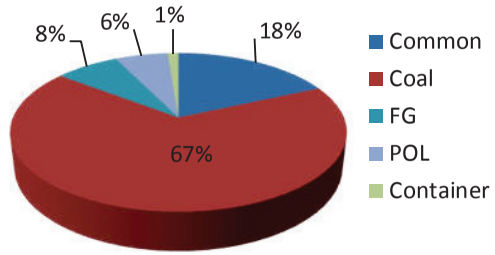
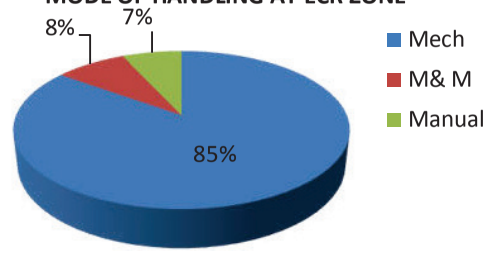


FIGURE 3.14
MODE OF HANDLING AT ECR ZONE



Northern Central Railway (NCR):

FIGURE 3.15
TYPE OF SIDING AT NCR

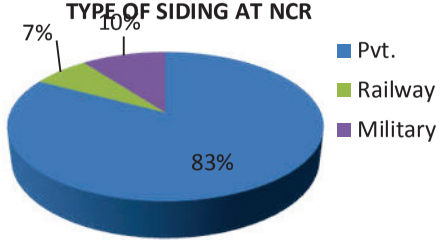


FIGURE 3.16
TYPE OF COMMODITY AT NCR

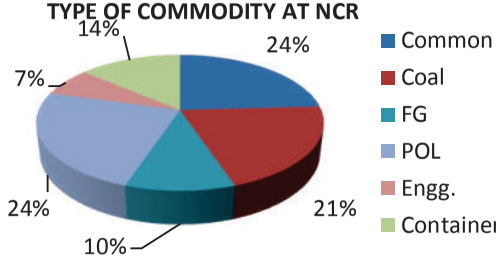
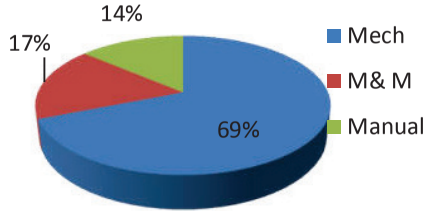


FIGURE 3.17
MODE OF HANDLED AT NCR ZONE



South Central Railway (SCR):

FIGURE 3.18
TYPE OF SIDING AT SCR ZONE

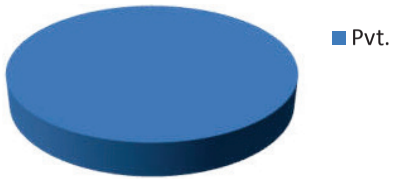


FIGURE 3.19
TYPE OF COMMODITIES AT SCR ZONE

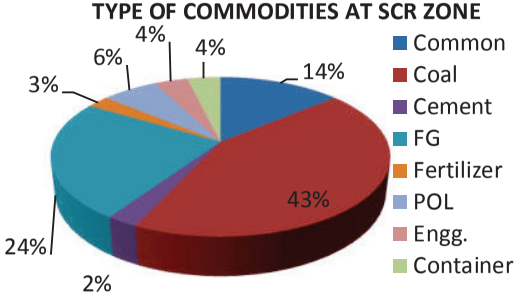
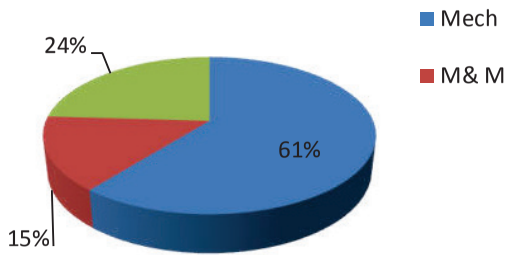


FIGURE 3.20
MODE OF HANDLING AT SCR ZONE



West Central Railway (WCR):

FIGURE 3.21
TYPE OF SIDING AT WCR ZONE

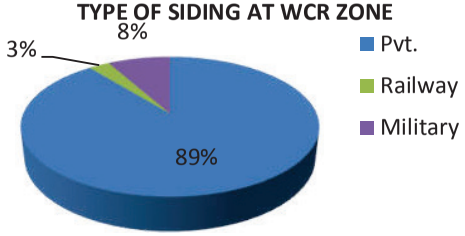


FIGURE 3.22
TYPE OF COMMODITIES AT WCR ZONE

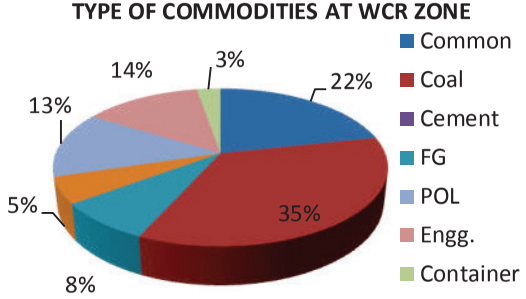
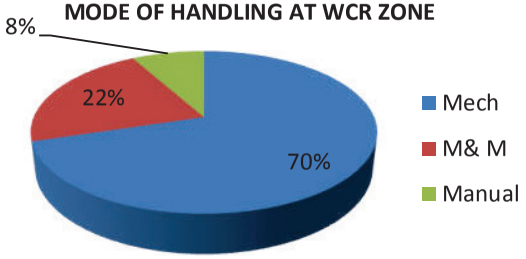


FIGURE 3.23
MODE OF HANDLING AT WCR ZONE



Central Railway (CR):

FIGURE 3.24
TYPE OF SIDING AT CR ZONE

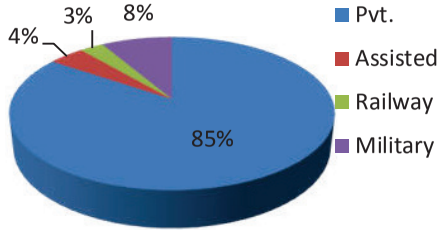


FIGURE 3.25
TYPE OF COMMODITIES AT CR ZONE

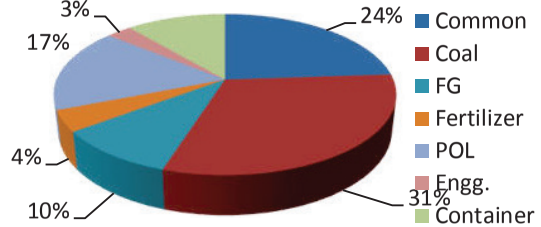
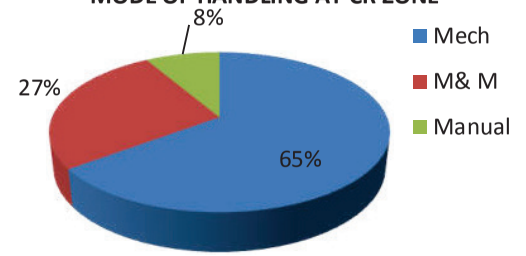


FIGURE 3.26
MODE OF HANDLING AT CR ZONE



Western Railway (WR):

FIGURE 3.27
TYPE OF SIDING AT WR ZONE

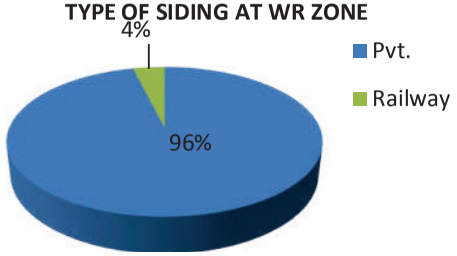


FIGURE 3.28
TYPE OF COMMODITIES AT WR ZONE

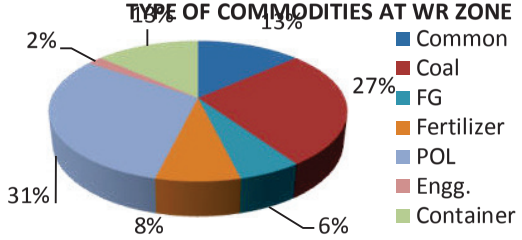
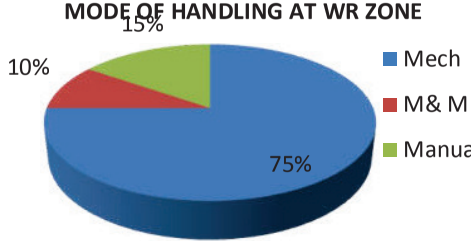


FIGURE 3.29
MODE OF HANDLING AT WR ZONE



South Western Railway (SWR):

FIGURE 3.30
TYPE OF SIDING AT SWR ZONE

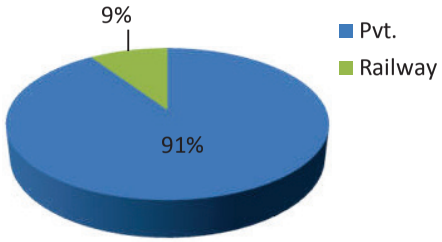


FIGURE 3.31
TYPE OF COMMODITIES AT SWR ZONE

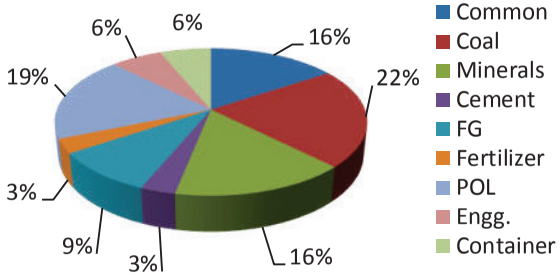
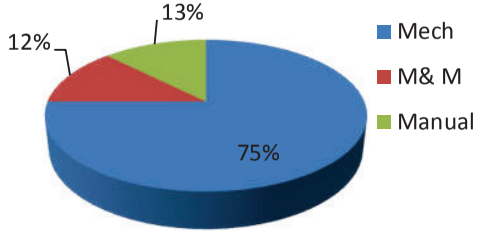


FIGURE 3.32
MODE OF HANDLING AT SWR ZONE



North Western Railway (NWR)

FIGURE 3.33
TYPE OF SIDING AT NWR ZONE

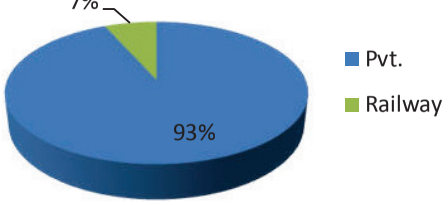


FIGURE 3.34
TYPE OF COMMODITIES AT NWR ZONE

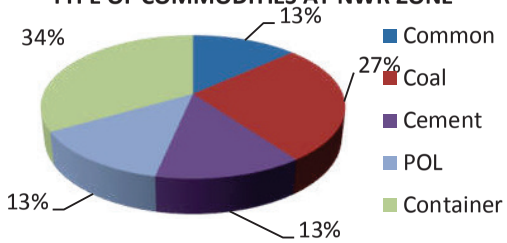
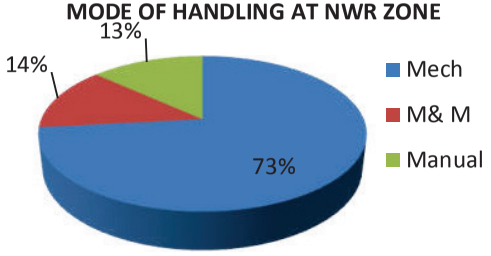


FIGURE 3.35
MODE OF HANDLING AT NWR ZONE



Northern Railway (NR):

FIGURE 3.36
TYPE OF SIDING AT NR ZONE

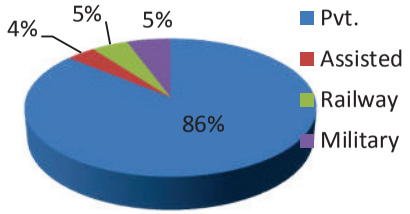


FIGURE 3.37
TYPE OF COMMODITIES AT NR ZONE

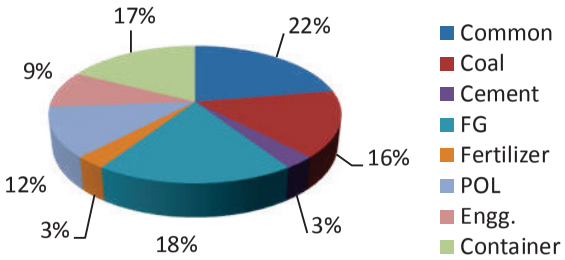
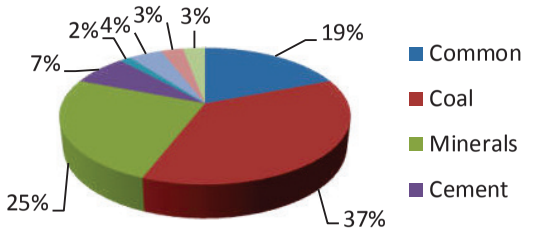


FIGURE 3.38
TYPE OF COMMODITIES AT NR ZONE



Southern Railway (SR):

FIGURE 3.39
TYPE OF SIDING AT SR ZONE

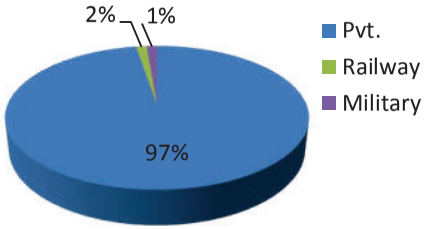


FIGURE 3.40
TYPE OF COMMODITIES AT SR ZONE

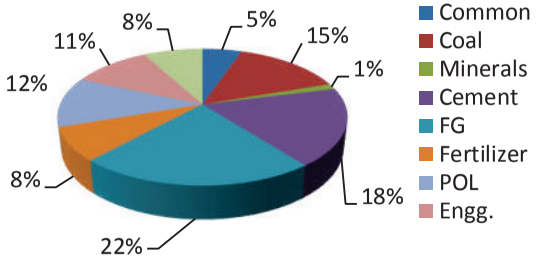
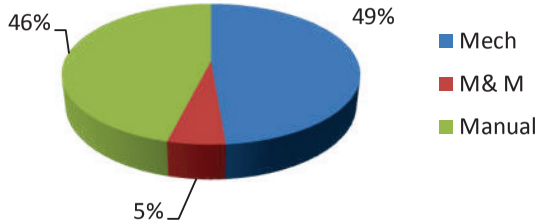


FIGURE 3.41
MODE OF HANDLING AT SR ZONE



South Eastern Railway (SER)

FIGURE 3.42
TYPE OF SIDING AT SER ZONE

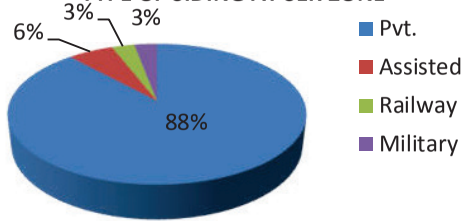


FIGURE 3.43
MODE OF HANDLING AT NR ZONE

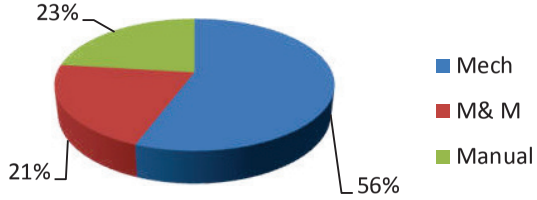
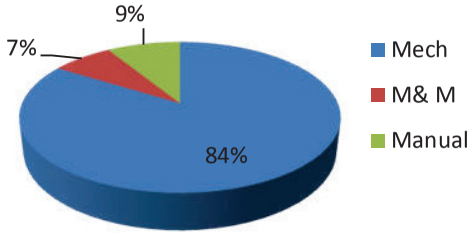


FIGURE 3.44
MODE OF HANDLING AT SER ZONE



Northeast Frontier Railway (NFR):

FIGURE 3.45
TYPE OF SIDING AT NFR ZONE

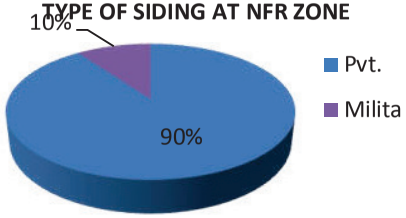


FIGURE 3.46
TYPE OF COMMODITIES AT NFR ZONE

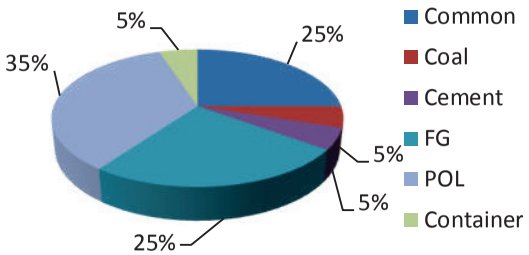
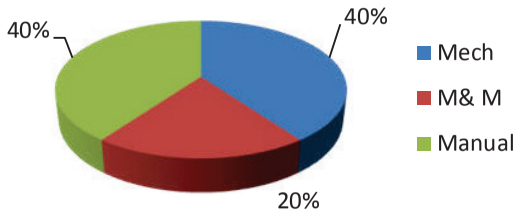


FIGURE 3.47
MODE OF HANDLING AT NFR ZONE



East Coast Railway (ECOR):

FIGURE 3.48
TYPE OF SIDING AT ECOR ZONE

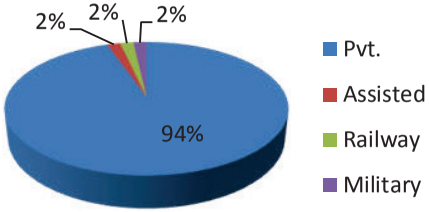


FIGURE 3.49
TYPE OF COMMODITIES AT ECOR ZONE

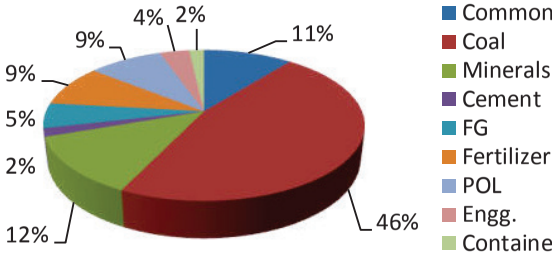
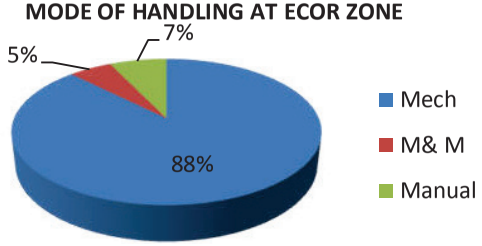


FIGURE 3.50
MODE OF HANDLING AT ECOR ZONE



Eastern Railway (ER):

FIGURE 3.51
TYPE OF SIDING AT ER ZONE

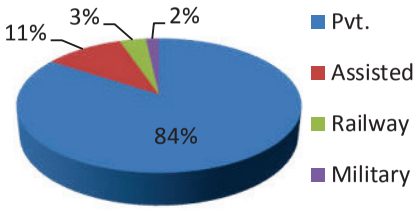


FIGURE 3.52
TYPE OF COMMODITIES AT ER ZONE

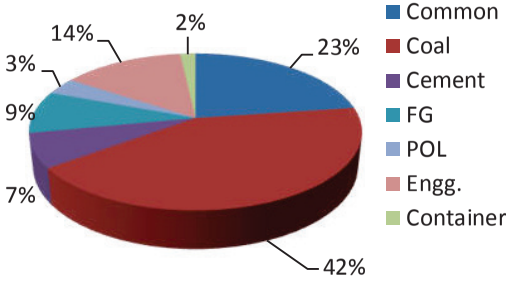
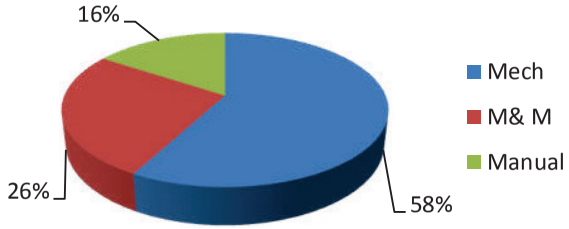


FIGURE 3.53
MODE OF HANDLING AT ER ZONE



North Eastern Railway (NER):

FIGURE 3.54
TYPE OF SIDING AT NER ZONE

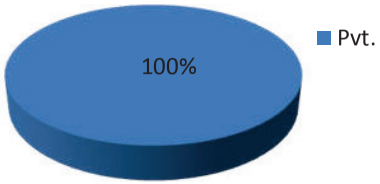


FIGURE 3.55
TYPE OF COMMODITIES AT NER ZONE

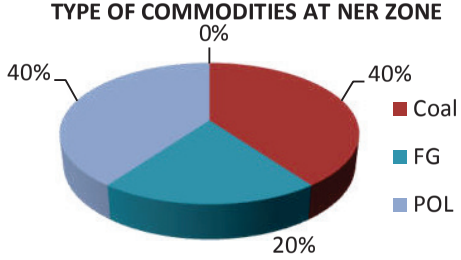
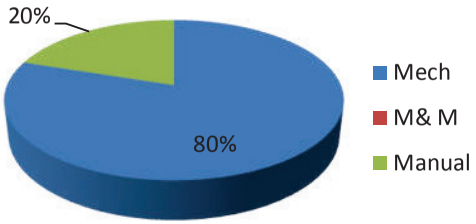


FIGURE 3.56
MODE OF HANDLING AT NER ZONE



590

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

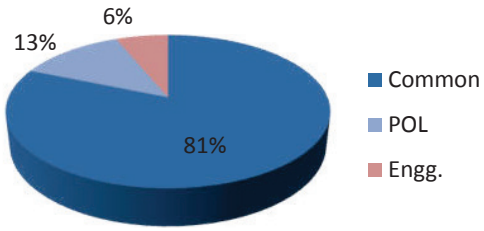


FIGURE 3.66
MODE OF HANDLING AT GOODSHED IN WCR

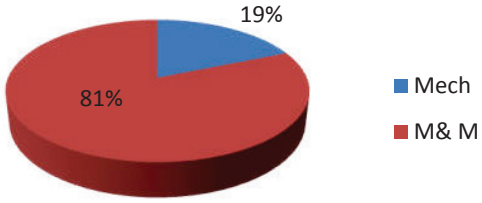


FIGURE 3.67
COMMODITY HANDLED AT GOODS SHED IN CR

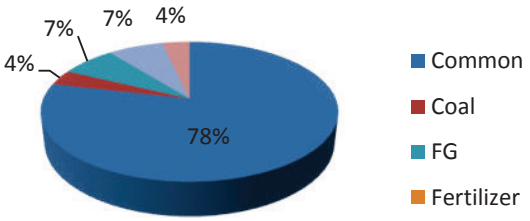


FIGURE 3.68
MODE OF HANDLING AT GOODS SHED IN CR

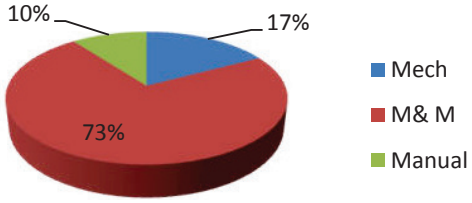


FIGURE 3.69
COOMODITY HANDLED AT GOOS DSHED IN WR

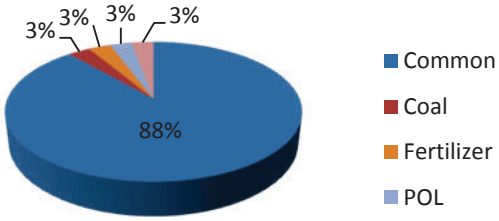


FIGURE 3.70
MODE OF HANDLING AT GOODS SHED IN WR

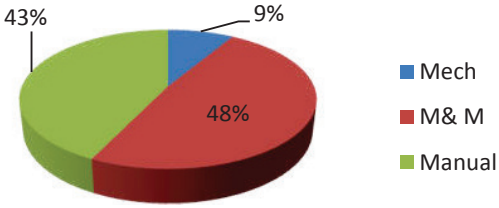


FIGURE 3.71
COMMODITY HANDLED AT GOODS SHED IN SWR

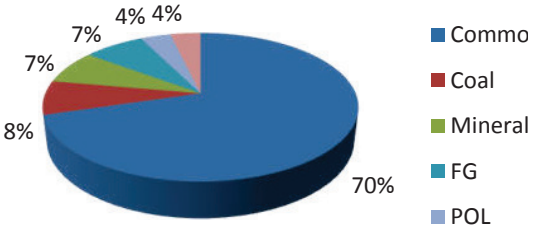


FIGURE 3.72
MODE OF HANDLING AT GOODS SHED IN SWR

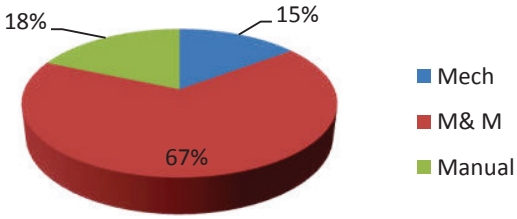


FIGURE 3.73
COMMODITY HANDLED AT GOODS SHED IN NWR

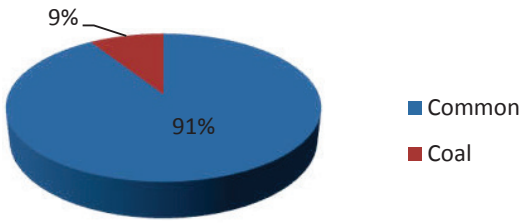


FIGURE 3.74
MODE OF HANDLING AT GOODS SHED IN NWR

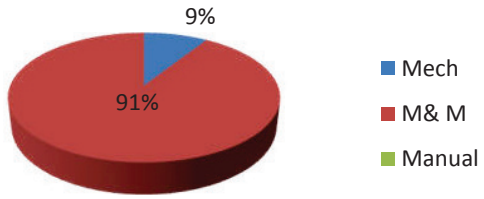


FIGURE 3.75
COMMODITY HANDLED AT GOODS SHED IN NR

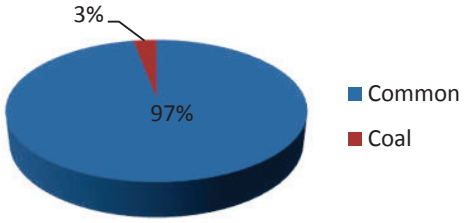


FIGURE 3.76
MODE OF HANDLING AT GOODS SHED IN NR

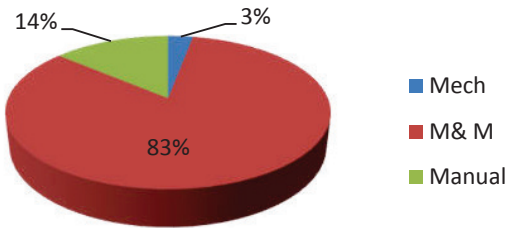


FIGURE 3.77
COMMODITIES HANDLED AT GOODS SHED IN SR

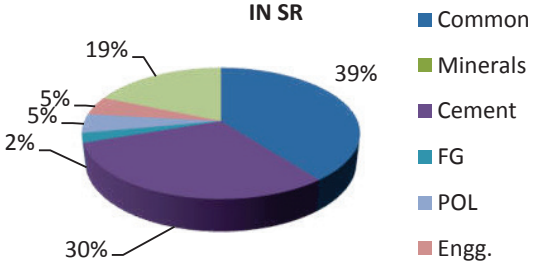


FIGURE 3.78
MODE OF HANDLING AT SR GOODS SHED IN SR

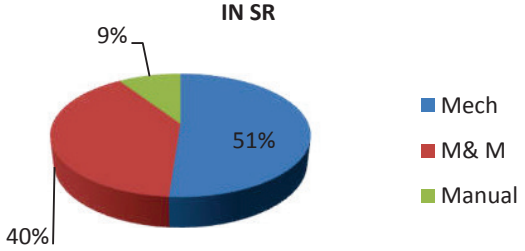


FIGURE 3.79
COMMODITIES HANDLED AT GOODS SHED IN NFR

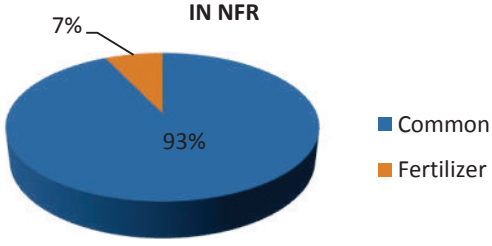


FIGURE 3.80
MODE OF HANDLING AT GOODS SHED IN NFR

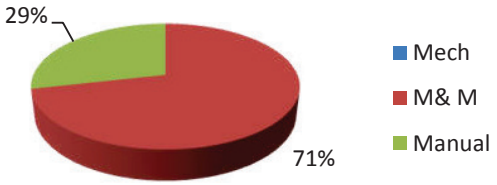


FIGURE 3.81
COMMODITIES HANDLED AT GOODS SHED IN ECOR

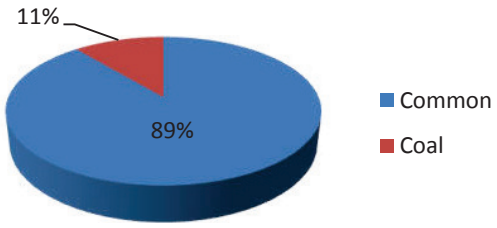


FIGURE 3.82
MODE OF HANDLING AT GOODS SHED IN ECOR

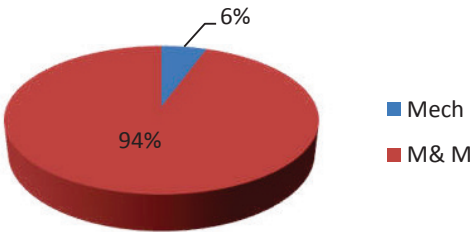


FIGURE 3.83
COMMODITIES HANDLING AT GOODS SHED IN ER

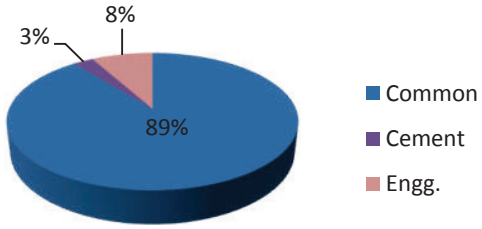


FIGURE 3.84
MODE OF HANDLING AT GOODS SHED IN ER

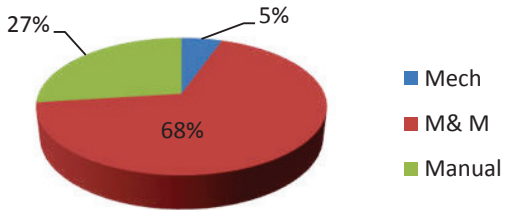


FIGURE 3.85
COMMODITIES HANDLED AT GOODS SHED IN NER

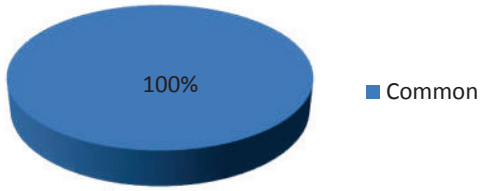
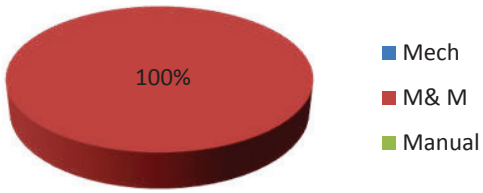


FIGURE 3.86
MODE OF HANDLING AT GOODS SHED IN NER



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

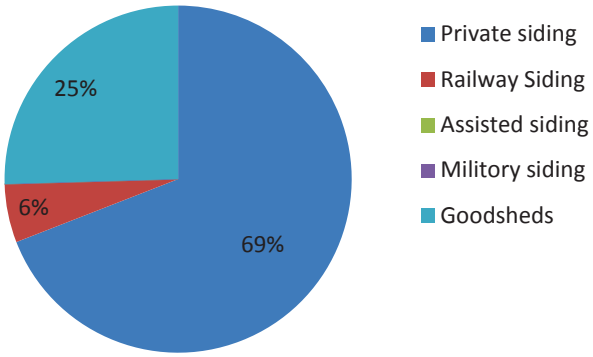
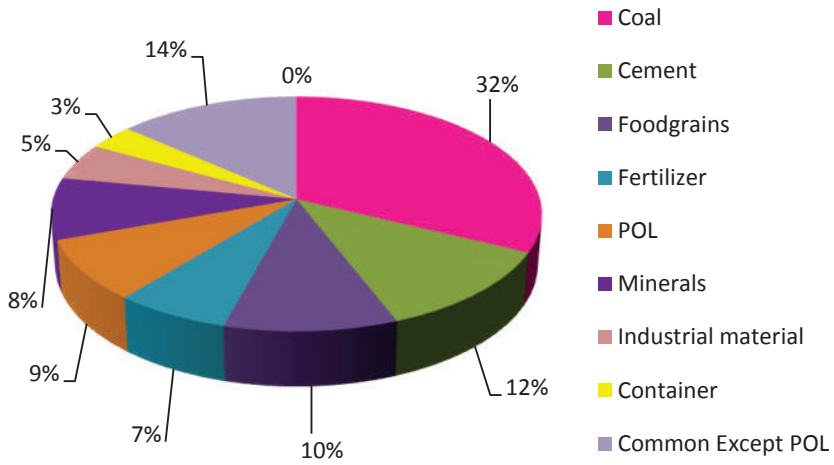


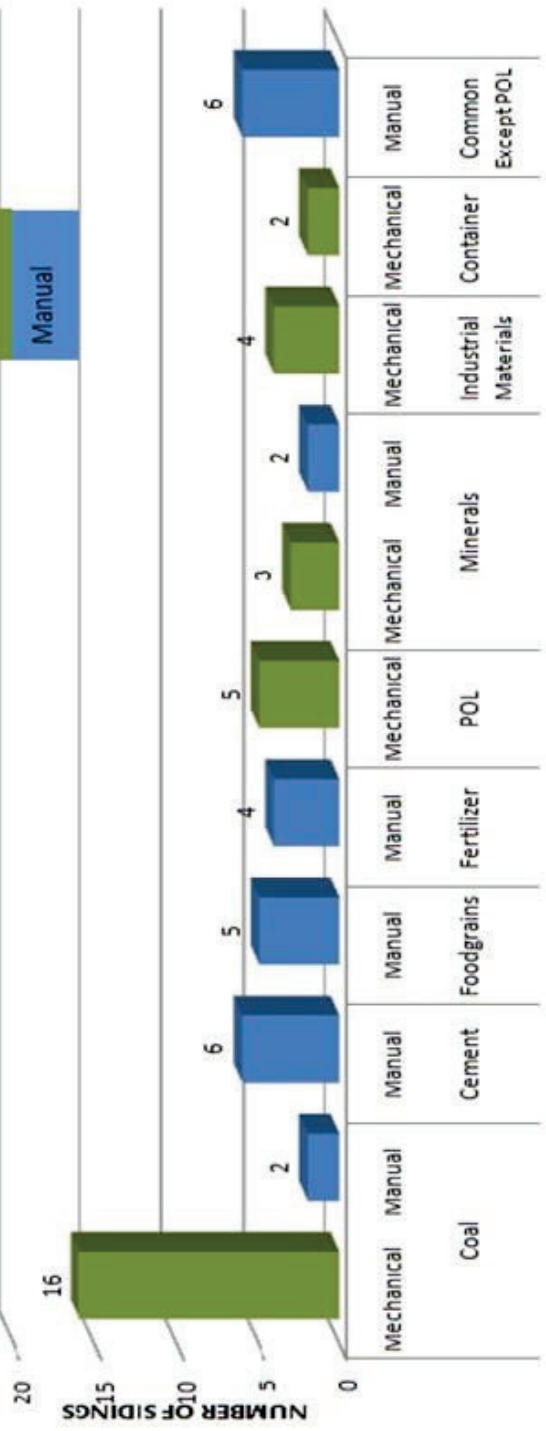
Figure 3.88
Commodities Handle at visited Siding



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	--	•

600

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.

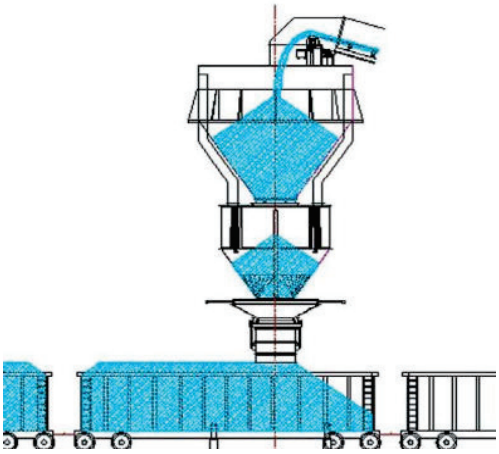
- The silos are cylindrical and fed by belt conveyors,
- The loading operation of the coal rake takes place with designated speed,
- For accurate weighing of coal to each wagon,
- Load cells are provided with silos.

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

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	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

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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	--	

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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

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	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

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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,
- 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.

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

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	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

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	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
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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
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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

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	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

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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,
- 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.

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:

- 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,

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,
- 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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- 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.

11.2.5 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,
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- Preventing the unnecessary removal of vegetation especially on steep slopes,
- The suitable use of sand bags or jute sheets.

11.2.6 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 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:

- 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 11.2
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 11.3
PLANT SPECIES FOR NOISE PRONE AREAS

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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

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.

ANNEXURE 1.1

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

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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]

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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

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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 गाईड लाईन 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(आपांक - 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 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 में 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]

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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 29th 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 Hanldle	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 Hanldle	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

ANNEXURE 2.3 Condt..

CENTRAL POLLUTION CONTROL BOARD

RITES
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

Page 2 of 2

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), $\mu g/m^3$	Annual 24 Hours**	50 80	20 80
Nitrogen Dioxide as NO_2, $\mu g/m^3$	Annual 24 Hours**	40 80	30 80
Particulate Matter (size less than 10µm) or PM_{10} $\mu g/m^3$	Annual 24 Hours**	60 100	60 100
Particulate Matter (size less than 2.5µm) or PM2.5 $\mu g/m^3$	Annual * 24 Hours**	40 60	40 60
Ozone (O3), $\mu g/m^3$	8 hours** 24 Hours**	100 180	100 180
Lead (Pb), $\mu g/m^3$	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), $\mu g/m^3$	Annual * 24 Hours**	100 400	100 400
Benzene (C_6H_6), $\mu g/m^3$	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.*

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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.*

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