Annual Report

2011-12

Central Pollution Control Board
Ministry of Environment & Forest
Website: cpcb.nic.in

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'Parivesh Bhawan', East Arjun Nagar,
Shahdara, Delhi - 110032
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CPCB, (ENGLISH), 300 COPIES, 2013

Prepared & Published by PR Division, Central Pollution Control Board on behalf of
Sh. J. S. Kamyotra, Member Secretary, CPCB.
Printing Supervision and Layout: Sh. S. Suresh, Ms. Anamika Sagar and Sh. Satish Kumar
Printed at: Chandu Press, Delhi

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CHAPTER I

INTRODUCTION

Under the provisions of The Water (Prevention & Control of Pollution) Act, 1974, the Central Government constituted the **'Central Board for the Prevention and Control of Water Pollution'** on September 23, 1974. The name of the Central Board was amended to **Central Pollution Control Board (CPCB)** under the Water (Prevention & Control of Pollution) Amendment Act, 1988 (No. 53 of 1988). The Central Pollution Control Board has been entrusted with the added responsibilities of Air Pollution Control since May, 1981 under the provisions of the Air (Prevention and Control of Pollution) Act, 1981. The enactment of the Environment (Protection) Act, 1986, which is umbrella legislation for enforcement of measures for protection of environment and several notifications of Rules under the Act widened the scope of activities of the Central Board.

The CPCB has been continuously playing a key role in abatement and control of pollution in the country by generating, compiling and collating data, providing scientific information, rendering technical inputs for formation of national policies and programmes, training and development of manpower and through activities for promoting awareness at different levels of the Government and Public at large.

1.1 FUNCTIONS OF THE CENTRAL BOARD

The main functions of CPCB, as spelt out in The Water (Prevention and Control of Pollution) Act, 1974, and The Air (Prevention and Control of Pollution) Act, 1981, are:

(i) To promote cleanliness of streams and wells in different areas of the States through prevention, control and abatement of water pollution; and,
(ii) To improve the quality of air and to prevent, control or abate air pollution in the country.

In addition to the main functions of promoting cleanliness of streams and wells, improving the quality of air and to prevent, control or abate air pollution, CPCB has been assigned following National Level functions:

- Advise the Central Government on any matter concerning prevention and control of water and air pollution and improvement of the quality of air;

- Plan and cause to be executed a nation-wide programme for the prevention, control or abatement of water and air pollution;
- Co-ordinate the activities of the State Boards and resolve disputes among them;
- Provide technical assistance and guidance to the State Boards, carry out and sponsor investigations and research relating to problems of water and air pollution, and for their prevention, control or abatement;
- Plan and organise training of persons engaged in programmes for prevention, control or abatement of water and air pollution;
- Organise through mass media, a comprehensive mass awareness programme on prevention, control or abatement of water and air pollution;
- Collect, compile and publish technical and statistical data relating to water and air pollution and the measures devised for their effective prevention, control or abatement;
- Prepare manuals, codes and guidelines relating to treatment and disposal of sewage and trade effluents as well as for stack gas cleaning devices, stacks and ducts;
- Disseminate information in respect of matters relating to water and air pollution and their prevention and control;
- Lay down, modify or annul, in consultation with the State Governments concerned, the standards for stream or well, and lay down standards for the quality of air;
- Establish or recognize laboratories to enable the Board to perform, and;
- Perform such other functions as and when prescribed by the Government of India.

1.2 FUNCTIONS OF THE CENTRAL BOARD AS STATE BOARD FOR THE UNION TERRITORIES

- Advise the Governments of Union Territories with respect to the suitability of any premises or location for carrying on any industry which is likely to pollute a stream or well or cause air pollution;
- Lay down standards for treatment of sewage and trade effluents and for emissions from automobiles, industrial plants, and any other polluting source;
- Evolve efficient methods for disposal of sewage and trade effluents on land;
- Develop reliable and economically viable methods for treatment of sewage, trade effluents and air pollution control equipment;
- Identify any area or areas within Union Territories as air pollution control area or areas to be notified under The Air (Prevention and Control of Pollution) Act, 1981; and
- Assess the quality of ambient air and water, and inspect wastewater treatment

installations, air pollution control equipments, industrial plants or manufacturing processes to evaluate their performance and to take steps for the prevention, control and abatement of air and water pollution.

1.3 DELEGATION OF POWERS BY CENTRAL POLLUTION CONTROL BOARD

As per the policy decision of the Government of India, the Central Pollution Control Board, delegated its powers and functions from time to time under Section 4, Sub Section 4 of The Water (Prevention and Control of Pollution) Act, 1974 and Section 6 of The Air (Prevention and Control of Pollution) Act, 1981 with respect to various Union Territories to respective Pollution Control Committees under the administrative control of local Administration **(Annexure-I).**

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CHAPTER II

CONSTITUTION OF THE CENTRAL BOARD

2.1 According to the provisions of The Water (Prevention & Control of Pollution) Act, 1974, the Central Board consists of the following members:

- A full-time Chairman, being a person having special knowledge or practical experience in respect of matters relating to environmental protection or a person having knowledge and experience in administering institutions dealing with the matters aforesaid, to be nominated by the Central Government;
- such number of officials, not exceeding five, to be nominated by the Central Government to represent Government;
- such number of persons, not exceeding five, to be nominated by the Central Government, from amongst the members of the State Boards, of whom not exceeding two shall be from amongst the members of the local authorities;
- such number of non-officials, not exceeding three to be nominated by the Central Government, to represent the interest of agriculture, fishery or industry or trade or any other interest which, in the opinion of the Central Government, ought to be represented;
- two persons to represent the companies or corporations owned, controlled or managed by the Central Government, to be nominated by the Government; and
- A full-time Member Secretary, possessing qualifications, knowledge and experience of scientific, engineering or management aspects of pollution control, to be appointed by the Central Government.

2.2 List of Board Members during year 2011 - 2012 is provided at **Annexure-II.** The organisation structure of the Central Pollution Control Board is provided at **Annexure-III.** Staff strength as on March 31, 2012 is furnished in **Annexure-IV & V.**

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CHAPTER III

MEETINGS OF CENTRAL POLLUTION CONTROL BOARD

3.1 MEETINGS OF THE CENTRAL BOARD

During the reporting period (i.e. April 1, 2011 to March 31, 2012), three meetings of the Central Board were held as under :

S.No.	Meeting No.	Date	Place
1.	159th	July 05, 2011	**Delhi**
2.	160th	October 31, 2011	**Delhi**
3.	161st	December 30, 2011	**Delhi**

3.2 MAJOR DECISIONS TAKEN BY THE BOARD

1. Approved the Annual Action Plan (AAP) for the Financial Year 2011-12 and Status of the Projects undertaken during last 3 years (2008-11);
2. Approved extension of appointment of Administrative Consultant in Central Pollution Control Board;
3. Approved the proposal for extension of Service by two years in respect of Shri Ishwar Singh, Additional Director (Law) after superannuation on 31.10.2011;
4. Approved the Substitution of Superannuated/Transferred Government Analysts at Central Pollution Control Board HQs Laboratories under Section 13 of the Environment (Protection) Act, 1986; and
5. Recognition of Environmental Laboratories under The Environment (Protection) Act, 1986.

3.3 NATIONAL CONFERENCE

The 57th Conference of Chairmen & Member Secretaries of CPCB/SPCBs/PCCs was organized during September 15, 2011 at "India Habitat Centre", New Delhi. Over 120 participants from 32 States/Union Territories, MoEF and CPCB attended the Conference.

The major issues discussed during the conference are as follows:

- ❖ Critically Polluted Areas (CPAs), Third Party Audit & Annual Environmental Statement [AES];
- ❖ Inventorization of 17 Category / Grossly Polluting Industries / Red Category of Industries;
- ❖ Strengthening of Ambient Air Quality Monitoring Network in India;
- ❖ Implementation of Noise (Regulation and Control) Rules, 2000 & Establishment of Noise Monitoring Network;
- ❖ Issues related to "Single Windows System/Common Application Form or Single Window Clearance; Issues on Common Consent Mechanism, Consent Fees and Training;
- ❖ Strengthening of Information Technology in CPCB & SPCBs and Water Cess
- ❖ Waste Management, Use of Washed, Blended or Beneficiated Coal.

3.4 WORKSHOP ON "REVIEW OF THE PROGRESS IN MORATORIUM LIFTED CRITICALLY POLLUTED AREAS"

As per the direction of MoEF, the Workshop was organized by CPCB to review the progress of implementation of action plans in 26 moratorium lifted critically polluted areas on September 14, 2011 at Tagore Hall, Scope Complex, Lodhi Road. The workshop was attended by the members of the Technical Review Committee, officers from MoEF, concerned SPCBs and members of CPCB In-house committee. The Major issues discussed during the workshop are as follows:

- Overall exercise of preparation & review of Action Plans and importance of involvement of SPCBs in it;
- Lifting of the moratorium in 26 CPAs based on the ground work initiation in the CPA and its certification by the concerned SPCB;
- Re-assessment of CEPI score based on the latest monitoring data (Feb.-March 2011) in all the 43 Critically Polluted Areas and brief analysis of the observed CEPI scores with particular regard to increase / decrease in the respective CEPI scores as compared to the scores evaluated earlier in 2010 by IIT Delhi; and
- Possibilities of consideration of re-imposition of the moratorium by the MoEF if the enforcement & compliance of formulated Action Plans are not as per time targets already set.

A number of recommendations were made by the expert members of the Steering Committee. However, CPCB has taken comprehensive action on the following issues deliberated during the workshop:

Recommendations of the Steering Committee	Action Taken by CPCB
Thorough check on the effectiveness of implementation of Action Plans by on-field monitoring.	An independent assessment to review the progress in the implementation of Action Plans of various CPAs has been undertaken by CPCB through its Zonal Offices. A Steering Committee meeting to review the progress made so far in the implementation of Action Plans in the 43 CPAs will be held in June, 2013.
To evolve methodology to review implementation of long term and short term action plans.	CEPI methodology is currently being used by CPCB to review the implementation of long term and short term action plans. CEPI has been evaluated based on the environmental quality monitoring data recorded during 2011. Similar exercise of CEPI evaluation is currently under progress based on the monitoring data recorded during Feb.-March, 2013. The

Recommendations of the Steering Committee	Action Taken by CPCB
	evaluated CEPI would reflect the present environmental quality of selected industrial clusters and also serves as a yardstick to assess the progress achieved in the implementation of action plans.
Thorough rechecking of recalculated CEPI values.	Environmental Quality monitoring is also being carried out periodically by CPCB and CEPI is being assessed based on the recorded monitoring data in the 43 CPAs. Interim CEPI assessment carried out during Feb.-March, 2011 has been thoroughly checked and the final report was uploaded on the website of CPCB. The latest round of monitoring is presently under progress in the 43 CPA since Feb., 2013 based on which CEPI will be recalculated. The evaluated CEPI would reflect the present environmental quality of selected industrial clusters and also serves as a yardstick to assess the progress achieved in the implementation of action plans.

Prof. S. P. Gautam, Chairman, CPCB mentioned that there are number of contentious issues in assessing the implementation of Action Plans on ground. He emphasized on the following-

- The local monitoring committee should look comprehensively on all the issues of the area;
- The carrying capacity / assimilative capacity studies of CPAs are required to decide the strategies on type and scale of industries that can be allowed in the area;
- There is a need to evolve methodology to review implementation of long term and short term action plans. The role and responsibility of various stakeholders need to be clearly defined;
- Preparation of remedial action plans for the 32 severely polluted areas declared in Jan.2010 and their implementation by various stakeholders up-to the level of Gram Panchayats;
- The SPCBs should prioritize the remedial measures proposed in the Action Plan to reduce environmental pollution; and
- The need for implementation of monitoring protocol as devised by the 'Working Group on CPA' to periodically assess the environmental quality of CPAs as well as framing of methodology for speedy implementation of Action Plans.

Prof. Gautam stated that moratorium can be lifted from any CPA subject to a set of area-specific conditions alongwith a commitment from concerned State Board about implementation. He also pointed out that moratorium can be re-imposed if no significant progress is achieved in the implementation of Action Plans.

Dr. Rajneesh Dube, Joint Secretary, MoEF asserted the need to address the problem of inter-sectorality in CPAs. He also advised for a regulatory mechanism to address various issues of CPAs and to devise a strategy as to what kind of capacity building is required in CPAs. The application of 'Polluter Pays Principle' in CPAs was also stressed upon.

Dr. R. K. Suri, Director, MoEF stressed on the need for ground check of implementation of Action Plans from time to time by a team of Central Government and State Government Officers. He also stressed on the need for thorough rechecking of recalculated CEPI values.

Thereafter, the concerned SPCBs presented the status of implementation of action plans in the respective CPAs.

During the course of discussions, officials of Maharashtra State Pollution Control Board suggested for revision of the methodology of CEPI evaluation including criteria for selection of an area for CEPI study and consideration of population within 2 km radius of study area.

Apart from the above, other major issues which cropped up during the course of discussions are summarized below:

1. It was felt that the target time of December, 2015 to achieve PM_{10} emissions (TPP) below 100 mg/Nm^3 is too long and there is a need to define implementation strategy with step-wise target time. (**NTPC Rihand and Shakthinagar, Singrauli**)
2. There is a need to explore a viable technology for utilization of red mud.**(Hindalco, Singrauli)**
3. Conversion to cleaner fuel is required in Paper mills located in Vapi. **(Vapi)**
4. GPCB pointed out the difficulties in getting continuous supply of CNG in Gujarat and requested to Central Government for intervention to sort out the issue. Similar problems are also faced by other states in getting clean fuel for industries and vehicles.
5. In response to the issue of pollution reaching Damanganga raised by the Chairman, Daman Pollution Control Committee, it was decided that Joint monitoring by a team comprising of the officials from CPCB, GPCB and Daman Pollution Control Committee be conducted to address the issue.

6. The problem of recalcitrant COD and spent solvent in Vapi need to be addressed **(Vapi).**
7. Action is required to tackle the high mercury level in the water upstream of river Upanar, Cuddalore **(Cuddalore)**.
8. The effluent being discharged into sea is not meeting the prescribed standards with respect to COD and remedial actions are required to tackle this problem **(Cuddalore).**
9. Deterioration with creek water quality in Navi Mumbai due to sewage disposal need to be developed and an action plan prepared for improving the water environment of the creek alongwith upgradation of Navi Mumbai CETP **(Navi Mumbai)**.
10. The effluent quality of CETP, Tarapur is not meeting the discharge norms, and immediate action is required to be taken so that CETP achieves the desired discharge norms **(Tarapur)**.
11. VOC concentrations are higher in Dombivalli as there is no closed disposal pipeline from CETP to creek. Necessary action is to be taken by MPCB to tackle this problem. **(Dombivalli).**

3.5 NATIONAL TASK FORCE

3.5.1 National Task Force for Implementaton of CREP recommendations

The third meeting of the Task Force on Thermal Power plants for implementation of CREP recommendations was held on November 08, 2011. Following are the main recommendations:

i. All non compliant power plants shall submit the compliance status of directions along with BAR CHART for implementation of action plan for achieving the environmental norms in a time bound manner
ii. Power plants shall submit action plan for providing Ash Water Recirculation System (AWRS).
iii. APGENCO's Power Plants shall be provided with online AAQ monitoring stations and stack emission monitors by July 2012 and all stations connected to CPCB /SPCB server.
iv. Standards should be developed for the parameters SO_2 & NOx for the plants using imported coal/pet coke.
v. All the power plants shall submit targeted action plan to achieve 100 % flyash utilisation as per November 03, 1999 notification.
vi. Integrated / joint studies for Environmental Quality Assessment may be taken up for the areas like Singrauli, Korba, Talcher, Ratnagiri etc.
vii. NTPC shall take initiatives on co-processing of wastes in thermal power plants

Accordingly, all non compliant thermal power plants were issued notices/ directions under appropriate section of Environmental protection acts. Plants also submitted time bound action plan for achieving emission norms. During 2011-12, out of 108 plants, 76 and 88 plants were complying with the emission and effluent standards respectively. CPCB is in the process to collect primary data w.r.t. SO_2 & NOx emission from thermal power plants for assessment and developing environmental standards. Further, CPCB has taken up study for environmental quality assessment for Singrauli and Chandrapur area identified as critically polluted based on CEPI. The trial studies for co-incineration of used resins, Anode butt and Spent Pot Lining in boilers of thermal power plants have taken up by CPCB.

3.5.2 National Task Force for Iron & Steel Plants

A National Task Force (NTF) was set up to assist improvement in the environmental performance of the Iron & Steel plants. NTF meeting was held on December 21, 2011 at CPCB, Delhi, wherein compliance status of Integrated Iron & Steel and progress in improving environmental performance was assessed. It was also noted that majority of the steel plants have achieved reduction in specific water consumption, 100% utilization of Blast furnace slag and pulverized coal injection in Blast furnace.

A few major concerns namely, removal of Cyanide in Biochemical Oxidation & Dephenolisation plants and utilization of LD slag were discussed. Industries have been advised to segregate cyanide bearing effluent and provide separate treatment. With regard to LD slag, in addition to existing use in sinter plant and internal road construction, industries havebeen asked to explore new areas for utilization of LD slag and submit action plan.

3.6 WORKSHOP ON RECOGNITION OF ENIVRONMENTAL LABORATORIES

A two day orientation workshop was organized for the scientists of State Pollution Control Boards (SPCBs) / Pollution Control Committees (PCCs) of South Zone on **"Revised Guidelines for Recognition of Environmental Laboratories Under The Environment (Protection) Act, 1986",** on 1st & 2nd December, 2011 at the Conference Hall of CPCB, Zonal Office (South), Bangalore, as a follow up action of the Orientation Workshop held on July 8, 2011 at CPCB, HQs, Delhi.

The objective of the workshop was to provide an insight on the Revised Guidelines to extend the scope of participation, to develop expertise for joint inspection and to encourage the SPCBs / PCCs laboratories for obtaining the Laboratory recognition

under The Environment (Protection) Act, 1986 as per the revised guidelines. 22 scientists participated in the two days workshop.

Technical sessions, field visit followed by panel discussion on the way forward for implementation of Laboratory Recognition in SPCBs / PCCs were the highlights of the two days workshop. The points discussed are listed below:

1. All State Pollution control Boards Head Quarter laboratories / Central laboratories shall acquire recognition under the Environment (Protection) Act, 1986 within a period of one year as per the Office Memorandum dated 12th August, 2011 of Ministry of Environment and Forests, Govt. of India.
2. The laboratories, whose recognition under the Environment (Protection) Act, 1986 got expired recently (expired before August 2011), can seek conditional renewal for one year i.e. only up to August 2012 as per OM Schedule of Implementation.
3. The SPCBs / PCCs shall take initiatives to obtain ISO 17025 (NABL) + OHSAS 18001 or ISO 9001 + OHSAS 18001 for Central laboratory initially and for Regional Laboratories at later stage.

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CHAPTER IV

COMMITTEES CONSTITUTED BY THE BOARD & THEIR ACTIVITIES

4.1 Constitution of Technical Expert Committee for "Evaluation of (i) proposal for utilization of the hazardous wastes as a supplementary resource or for energy recovery, or after processing under Rule 11 of the Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008; and (ii) guidelines on management & handling of High Volume Low Effect Wastes as listed under the Schedule-I of the Rules".

A Technical Expert Committee was constituted to evaluate and to recommend the proposals received for utilization of the hazardous wastes as a supplementary resource or for energy recovery, or after processing and finalization of guidelines on management & handling of High Volume Low Effect Wastes.

Table 4.1: The Composition of Committee

1.	Shri R.K. Garg , Former Managing Director, Indian Rare Earths Ltd.	**Chairperson**
2.	Shri K.P. Nyati	**Member**
3.	Prof. A.K Nema IIT, Delhi	**Member**
4.	Shri. M.J Pervez, Group Head & Director (Environment Management), NPC, New Delhi	**Member**
5.	Representative from Ministry of Environment & Forests	**Member**
6.	Representative from Projects & Development India Ltd.(PDIL), Noida	**Member**
7.	Representative from State Pollution Control Board	**Member**
8.	Sh. B. Vinod Babu, Senior Environment Engineer & Incharge HWMD, CPCB, Delhi	**Member Convener**

**Experts of relevant field, whenever required, will be invited for the meeting*

Scope:

The Rule 11 of the Hazardous Wastes (Management, Handling and Trans boundary Movement) Rules, 2008, which stipulates that *"The utilization of hazardous wastes as a supplementary resource or for energy recovery, or after processing shall be carried out by the units only after obtaining approval from the Central Pollution Control Board"*. Further, the Schedule-I of the Rules also stipulates that "The high volume low effect wastes such as fly ash, phosphor gypsum, red mud, slags from pyrometallurgical operations, mine tailing and ore beneficiation rejects are

excluded from the category of hazardous wastes. Separate guidelines on the management of these wastes shall be issued by CPCB.

In order to evaluate the aforesaid proposals of utilization of hazardous waste and guidelines for management & handling of High Volume Low Effect Wastes, the above mentioned Technical Expert Committee is constituted with the following terms of reference (TOR):

i. To evaluate proposal received from various applicants for utilization of hazardous wastes as a supplementary resource or for energy recovery, or after processing and shall consider the following aspects:

   - Environmentally soundness of the technology proposed for utilization of hazardous waste;
   - Pollution potential of emissions/discharges to environment including potential of ground/soil contamination;
   - To suggest limits for emissions/discharges during Hazardous Waste utilization;
   - The adequacy of proposed facility for control of pollution;
   - Extent of use of hazardous/toxic waste;
   - Quantum of use of resources and utilization such as energy, water, steam etc;
   - Degree of reuse/recovery/recycle of resources;
   - Quantity of residue/waste generated; and
   - Potential exposure to workers and nearby community.

ii. To recommend after evaluation for granting approval as per Rule 11 of the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008;
iii. Any other relevant matter concerning utilization of hazardous wastes;
iv. To suggest the approach to be followed for preparation/finalization of the guidelines for management & handling of High Volume Low Effect Wastes;
v. To provide suitable inputs based on the expertise and studies to be taken up if required for preparation of the guidelines; and
vi. To finalize and recommend the final draft guidelines for placing before the Technical Review Committee of MoEF prior to publication as CPCB guideline.

The Technical Expert Committee shall meet when at least 05 cases have been accumulated or at every two months, whichever is earlier. The tenure of the committee as per the terms of reference will be initially for a period of one year and, if required can be extended further by the Chairman, Central Board.

4.2 CONSTITUTION OF WORKING GROUP ON THE ISSUES OF BIO-MEDICAL WASTE, E-WASTE & HAZARDOUS WASTE MANAGEMENT:

The Working-Group constituted to formulate the strategies and implementation plans for effective management of Hazardous, Bio-medical and Electronic wastes in accordance with the provisions under the Environment (Protection) Act, 1986.

Table 4.2: The constitution of the committee.

1.	Member Secretary, Gujarat Pollution Control Board	**Member Convener**
2.	Representative of Andhra Pradesh SPCB	**Member**
3.	Representative of Kerala SPCB	**Member**
4.	Representative of Haryana SPCB	**Member**
5.	Representative of Jammu & Kashmir SPCB	**Member**
6.	Representative of CPCB	**Member**

4.2.1 Hazardous Waste Management

1. To suggests methodology and mechanism for inventorisation of Hazardous Waste and its disposal in the country;
2. To identify the gaps in the management of Hazardous Waste;
3. To suggest action points for encouraging utilization and co-processing of Hazardous Waste and their implementation;
4. To suggests ways for checking illegal storage/dumping of Hazardous Waste;
5. To suggest methodologies for implementing performance evaluation of Common Hazardous Waste TSDF and also captive disposal facilities; and
6. To suggest ways for checking illegal import of Hazardous Waste and sensitizing Custom Authority.

4.2.2 Bio-medical Waste Management

1. To suggest Methodology for assessment of Bio-medical Waste Generation in the Country;
2. To identify the gaps and to suggest strategies for effective management of Bio-medical waste in the Country;
3. To evolve methods to ensure effective operation of Common Bio-medical Waste Treatment Facilities and also individual treatment facilities;
4. To evaluate existing On-site & CBWTF treatment equipment capacity in the Country;

5. To suggest various environmentally sound technologies (EST) for treatment of Bio-medical Waste & to suggest disposal options for treated Bio-medical Waste; and
6. Awareness programme for effective management of Bio-medical waste.

4.2.3 E-waste Management

1. To suggest methodology and mechanism for inventorisation of E-waste generation in the country and to assess the E-waste generation scenario in the country;
2. To suggests ways for checking illegal imports of E-waste;
3. To suggests ways for inclusion of informal/unorganized sectors in the mainstream;
4. To identify the gaps in the management of E-waste;
5. To suggest various environmental sound low cost recycling technology for recovery of precious materials from E-waste; and
6. To suggests ways for reduction of hazardous substances in the component of the electronic equipments.

4.3 "PROJECT STEERING COMMITTEE" AND "TECHNICAL EXPERT COMMITTEE" FOR REMEDIATION OF HAZARDOUS WASTE CONTAMINATED DUMP SITES IN INDIA

Ministry of Environment & Forests, (MoEF), Government of India has designed the project for remediation of hazardous waste contaminated dump sites to provide a comprehensive framework for remediation of hazardous waste contaminated legacy sites, which are causing severe environmental problems and posing risk to human health. The objective of the project is to prepare a detailed project report for remediation of priority hazardous waste contaminated dump sites in first phase and subsequently undertaking environmentally sound remediation of the contaminated sites in the second phase. The project shall be funded under the National Clean Energy Fund (NCEF) of Government of India with a financial grant of 40% of the project cost. The project was implemented by the Central Pollution Control Board (CPCB) under over-all supervision of Ministry of Environment and Forests (MoEF). For this purpose two committees were constituted under the chairmanship of Chairman Central Board; the "Project Steering Committee" which shall take necessary decisions on actual execution of the project and the "Technical Expert Committee" will finalize the technical parameters.

The key activity of the project is the preparation of detailed project report (DPR) for the 23 identified priority hazardous waste contaminated sites in 12 areas spread across 8 states in India. The activities will cover (i) finalization of project funding

mechanism, (ii) developing methodological framework for detailed site investigation reports, (iii) selection of suitable technology for selected remediation criteria, (iv) preparation of Detailed Project Reports (DPRs) and (v) execution of actual remediation work. The project findings would provide the basis for future remediation of remaining hazardous waste contaminated sites in the country.

4.3.1 Role of Project Steering Committee:

The proposal envisages setting-up of a 'Project Steering Committee' (PSC) to take necessary decisions pertaining to administrative, technical and financial matters for smooth execution of the project. The main functions of the Project Steering Committee are;

(i) To obtain 60% share from the respective State Governments for the project expenditure. This includes:

- Follow-up with respective State Governments and SPCBs to evolve any feasible mechanism for funding by available sources and proportionately participation from State funding/Polluter Pay/Public-Private participation.
- Consultations with State Pollution Control Boards to identify polluter (s), to evolve modalities for polluter's share in remediation expenditure and to calculate share of each polluter in case of multiple polluters.
- To obtain necessary approvals for the financial support structure from MoEF and State Governments.

(ii) To suggest the structure of dedicated working team at CPCB. This includes Recommendations on out-sourcing of external manpower/ consultants, tenure of association and their remuneration etc.

(iii) Demarcation of project area for studies and remediation works.

(iv) Recommendations for inviting EOIs and bids for preparation of DPRs and also for actual remediation works.

(v) Coordination with 'Technical Expert Committee' (TEC) for seeking concurrence and finalization of technologies/methodologies/remediation standards etc. for both DPR and actual remediation work.

(vi) Finalization of bidding document (for DPRs), outlining scope of each project and setting parameters for detailed studies, approach for remediation, scope of geophysical and hydro-geological studies, approach for selection of technologies, studies to find out remediation options, risk assessment studies etc.

(vii) Setting criteria for short-listing eligible parties, scrutiny of EOIs and recommending the agencies for inviting project specific bids.

(viii) Progress assessment of the work at site. Desired recommendation/required incidental changes in scope of the studies based on findings at the time of detailed investigation studies if required.

(ix) Short-listing of bids and award of work for final remediation work with prior approvals of MoEF.

(x) To guide and review the progress made by CPCB's working-team for remediation of contaminated sites.

(xi) Progress assessment in implementing the project and apprising the same to Project monitoring team under Secretary MoEF.

(xii) To propose suitable re-appropriation of funds if necessary for execution of project.

(xiii) Recommend on awarding the works for an amount not exceeding the sanctioned budget for each activity within the scope of NCEF funding and after obtaining necessary clearance from MoEF.

Table 4.3 : Project Steering Committee (PSC) Composition

1.	Chairman, CPCB	**Chairperson**
2.	Member Secretary, CPCB	**Member**
3.	Representative of MoEF	**Member**
4.	Chairman, Tamilnadu SPCB	**Member**
5.	Chairman, Kerala SPCB	**Member**
6.	Chairman, Orissa SPCB	**Member**
7.	Chairman, Gujarat SPCB	**Member**
8.	Chairman, Uttar Pradesh SPCB	**Member**
9.	Chairman, Madhya Pradesh SPCB	**Member**
10.	Chairman Rajasthan SPCB	**Member**
11.	Chairman West Bengal SPCB	**Member**
12.	In-charge, HWMD, CPCB	**Member Convener**

The meeting of the Project Steering Committee will be held atleast once in 45 days for initial six months of the project followed by bi-monthly meetings.

4.3.2 Role of Technical Expert Committee (TEC)

The 'Technical Expert Committee' has been constituted as an advisory body for suggesting and recommending technical aspects of the project for "Remediation of Hazardous Waste Contaminated Dump Sites". The following are the role of Technical Expert Committee:

(i) To hold meetings on invitation by Project Steering Committee.

(ii) Independent review of technical aspects and to provide comments and

recommendations on scope of work proposed for detailed project reports.

(iii) To provide suggestions and technical inputs to PSC at the time of actual remediation of sites is in progress.

(iv) To suggest site specific remediation standards, future land-use of remediated sites and also to short-list options for remediation technologies.

(v) Acceptance of Detailed Project Reports

Table 4.4 : Technical Expert Committee Composition

1.	Chairman, CPCB	**Chairperson**
2.	Consultant from GIZ	**Member**
3.	Representative from IIT Delhi	**Member**
4.	Representative from NEERI	**Member**
5.	Representative from NGRI	**Member**
6.	N.K. Verma, Retd Addl. Director, CPCB	**Member**
7.	Representative from NPC	**Member**
8.	In-charge, HWMD, CPCB	**Member Convener**

The Technical Expert Committee shall hold at-least one meeting prior to finalization of bids meetings for DPR, and also for actual remediation. The TEC shall also meet as and when requested by the Project Steering Committee.

4.4 EXPERT COMMITTEE ON BIO-MEDICAL WASTE MANAGEMENT:

The second amendments of the Bio-medical Waste (Management & Handling) Rules, 1998 (dated 02/6/2000) states that "the occupier/operator wishing to use other state-of-the-art technologies shall approach the Central Pollution Control Board to get the standards laid down to enable the prescribed authority to consider grant of authorization". A committee is, therefore, constituted for evaluation of the technologies proposed by the occupier/operator of a common bio-medical waste treatment facility and also for taking recommendation of their suitability for treatment of bio-medical waste including the standards, wherever necessary.

The role of the committee is :

(i) To evaluate the technologies proposed by the occupier/operator for a bio-medical waste treatment facility for treatment of bio-medical waste

(ii) To recommend suitable technologies & their standards; and

(iii) To suggest on any other matter relating to the Bio-medical waste management in the Country.

Composition of the Committee:

1.	Dr. T.K. Joshi Director, Deptt. of Occupational Environment & Health B.L. Taneja Block, Ground Floor Maulana Azad Medical College, New Delhi – 110 002	**Chairman**
2.	Sh. M.Subba Rao, Director (HSMD) or (Representative of MoEF) Ministry of Environment & Forests, Govt. of India Paryavaran Bhawan, CGO Complex New Delhi – 110 003	**Member**
3.	Dr. Anil Kumar Chief Medical Officer (NFSG) Directorate General of Health Services Ministry of Health & Family Welfare Room No. 403, A wing, Nirman Bhawan, New Delhi – 110 108	**Member**
4.	Dr. D.K.Sharma Medical Superintendent All India Institute of Medical Sciences New Delhi- 110 029	**Member**
5.	Dr. Yashpal Sharma Medical Superintendent SMGS Hospital, Shalamar Road, Jammu Jammu – 180 001, J & K State.	**Member**
6.	Dr. Anita Arora Deptt. of Microbiology Escort Heart Institute & Research Centre A Fortis Network Hospital, Okhla Road, New Delhi – 110 025	**Member**
7.	Sh.J.S.Kamyotra, Member Secretary Central Pollution Control Board Parivesh Bhawan, East Arjun Nagar Shahdara, Delhi – 110 032	**Member**
8.	Dr. M.J.Parvez (or) Representative of NPC Director (Environment) National Productivity Council 5th & 6th Institutional Area Lodhi Road, New Delhi – 110 003	**Member**

9.	Dr. B.K.Das Professor, Dental Wing SCB Medical College Cuttack, Orissa	**Member**
10.	Dr. K.S.Baghotia State Programme Officer (Leprosy & BMW Management Govt. of Delhi) F-17, Karkardooma, Delhi – 110 032	**Member**
11.	Shri Ravi Agarwal (or) representative Co-ordinator, Srishti H-2, Ground Floor, Jangpura Extension New Delhi – 110 014	**Member**
12.	Incharge, HWMD, CPCB	**Member Convener**

4.5 EXPERT COMMITTEE ON THE ENVIRONMENTAL PROBLEMS DUE TO STONE CRUSHERS IN SONBHADRA DISTRICT

Considering the concerns shown by National Commission for Protection of Child Rights (NCPCR) regarding the problem of air and water pollution and water resource depletion due to stone crushing and related activities in Sonbhadra District, U.P., CPCB on 16th May 2011 constituted an Expert Committee to study the environmental problems due to stone crushers and related activities in Sonbhadra District, U.P. and to suggest preventive anda mitigative measures, as below:

1.	Mr. U. N. Singh, AD & Incharge, PCI (SSI), CPCB	**Member**
2.	Mr. M. Q. Ansari, AD & Incharge, CPCB ZO-North, CPCB	**Member**
3.	Mr. M. J. Parvez, Director/Gr.Head (Env. Man), NPC	**Member**
4.	Mr. M. A. Patil, Director, Resource Conservation & Management, FICCI	**Member**
5.	Representative of Uttar Pradesh SPCB	**Member**
6.	Mr. Nazim uddin, SEE /Sc. D, CPCB	**Member**

This Expert Committee visited the Dalla stone crusher and mining area during 13th and 14th July 2011 and based on the field observations and discussions held with the stakeholders during the field visit, gave certain recommendations for the area. To ensure implementation of the recommendations of the Expert Committee, CPCB in exercise of the power conferred under section 18 (1) (b) of the Air (Prevention & Control of Pollution) Act, 1981 issued the following directions in respect of stone crushers in Sonbhadra district to UPPCB on 10.1.2012:

i) To ensure installation of pollution control equipments and implementation of pollution abatement measures for stone crushers as recommended by the Expert Committee as well as compliance of regulatory norms as per the Environment (Protection) Act, 1986 by individual stone crushers in Sonbhadra district within 3 months.

ii) To take necessary action, including strengthening the compliance monitoring regime to ensure implementation of environment protection measures as recommended by the Expert Committee in stone crushers areas and stone mining areas of Sonbhadra district within the specified time frame.

4.6 WORKSHOP FOR MASS AWARENESS ON IMPLEMENTATION OF BATTERIES (MANAGEMENT & HANDLING) RULES, 2001

I. Mass Awareness Programme

CPCB organized one Day Mass awareness programmes during 2012 at Chennai and invited the stake holders' viz. manufacturers, importers, re-conditioners, assemblers, dealers, recyclers,consumer and bulk consumer, SPCBs and CPCB were invited. The major recommendations/suggestions received during the work-shop are summarized below:

II. Recommendations for effective implementation

1. Stringent actions are required to be taken against few dealers so as to create an impact to get other dealers too registered with SPCB.
2. Close watch on manufacturers and importers.
3. Organizing regional office level interaction meets of manufacturers and dealers with SPCB to create awareness and also to ensure effective implementation.
4. To recommend Government to increase manpower by approving additional posts.
5. The manufacturers should ensure setting-up adequate number of collection centers in association with dealers/importers.
6. It is recommended that manufacturers should be mandated to supply only to dealers who are registered and certified. Certification following registration will ensure transfer of maximum used batteries to legally operating recyclers and reduce the input to unorganized sector. It is appropriate to conduct an audit of the dealers for certification.
7. Manufacturers to be mandated to conduct periodical awareness programme down to taluk and village level for the dealers; the number of collection centers to be increased by manufacturer and wide publicity to be given.

8. The present incentives to consumers for returning the used batteries may be revised taking into account the practices in other countries.
9. The distribution centers can be converted into collections centers.
10. Warranty card should specify the list of collection centers in the country.
11. As per the amendment of battery rules, so as to stipulate the obligations to collect 1:1 is on the dealer.
12. Dealer is responsible to deliver to the manufacturer or is nominated agent that the used/scrap batteries at least to the extent of 90% of dealers sales volume.
13. There should be some provision for rebate in the Excise Duty and VAT for the recovered batteries.
14. Manufactures have to announce some attractive offers to the dealers in turn the dealers also follow the same to the customers.
15. State boards/PCCs to take stringent action on dealers who sells the old batteries to kabadiwallas/ backyard smelters and also drive them to return to manufacturer during purchase of new batteries.
16. Dealers and authorized collection centers must have proper arrangement for storing for storing of the used batteries.
17. Used batteries storage hall should have adequate size, proper ventilation and floor & wall should have acid proof tiles.
18. Before shell/auction the residual acid in the used batteries should be properly drained and collected, stored in the plastic containers.
19. All the collected acid may be reused/recycled or properly treated/neutralised and the generated sludge should be sent to nearby the approved TSDF site for treatment.

III. Action Taken by Central Pollution Control Board

Repeated interactions were made with all the SPCBs/PCCs requesting them to undertake the following tasks.

- To file the pending annual compliance status reports to CPCB on priority basis.
- To create public awareness though advertisements, publications, posters or by other means with regard to the hazards of lead and inform different stake holders about their responsibilities.
- To ask the dealers submit a copy of the return in Form No. - IV to SPCBs/ PCCs as per the amendment rule,2010
- To ask the dealers submit a copy of the return in Form No. V to the Manufacturers by 31st May (for sale during October- March) and 30th November (for sale during April-Sep.) every year i.e., a statement of return

towards sale of new batteries and collection of used batteries for the specified period.

- Importers of New Lead Acid Batteries were asked to submit Half-yearly returns as per Form-I against sale of new batteries and collection of used batteries (for the period October-March) and 31st December (for the period April-September) every year.
- Show Cause Notice served the importers of New Lead Acid batteries those who are not submitted half-yearly returns to SPCBs/PCCs copy with CPCB and Customs authority.
- Proposed to give advertisement/public notice in the leading newspapers in the country for submission of Half-yearly returns as per Form-I

IV. Response received:

- 13 State Pollution Control Boards and 01 Pollution Control Committee filed their annual compliance status reports 2011-12 to CPCB due to repeated interaction.
- 552 importers of new lead acid batteries have submitted their half-yearly returns against 1694 registration granted for importers of new lead acid batteries.

V. For Effective Implementation of the Battery Rules the following task to be adopted:

A. Awareness Programmes:

(i) Need to enhance the frequency of conducting mass awareness programmes at regional level/district level jointly by SPCBs, PCCs and all stake holders.
(ii) Need to regularise/increase frequency of public notices in newspapers, radio, Television and other media such as hand-outs, brochures, and newsletters.
(iii) Mass media drive though TV can be used to create awareness of public.

B. Incentives to discourage backyard smelting

(i) Methods to augment quantum of discount offered
(ii) Possibility of Upfront deposit scheme
(iii) Applicability of excise duty on the sale of used/scrap batteries.
(iv) Imposition of Eco-tax to encourage movement of batteries to registered recyclers only.

C. Suggestions for amendments

(i) The mark RECYCLE on the lead ingots does not have much significance in today as most of the lead is coming from secondary smelting.

(ii) In Form-I , the name of bulk consumer should be omitted and in its place, the re-conditioners and assemblers should be added.
It is to consider amending the rules so that the dealers file the returns directly to SPCB/PCC.

(iii) In order to enable SPSBs/PCC to handle such large number of the dealers, it is suggested that the returns be filed online through the internet (like Income tax returns).

(iv) Each dealer/importer is given a user id and password so that they can file online returns.

(v) The time target fixed for State boards to send the annual compliance report to CPCB is 30th April of every year as per the BMHR rules. But the State boards are getting the returns from the different stake holders by 30th June of every year as per the said rules. Some of the State board suggested modifying the date of filling of the Annual Compliance Report (ACR) accordingly.

(vi) Filing returns by the stake holders, some are mentioning only numbers and some are mentioning only weight of batteries collected. State boards are finding difficulties to compile the data which receive once in six month it needs to specify the quantity either by MT or by Numbers.

* * *

CHAPTER V

AIR AND WATER QUALITY MONITORING

5.1 WATER QUALITY MONITORING IN INDIA

5.1.1 Background

The availability and the quality of the fresh water resources is the most pressing of the many environmental challenges on the national horizon in India. The stress on water resources is from multiple sources and the impacts can take diverse forms. Geometric increase in population coupled with rapid urbanization, industrialization and agricultural development has resulted in high impact on quality and quantity of water in India. The urban population has increased almost 11 folds in last 100 years period from 26 million to 285 million. Its share in total population has also increased almost 3 fold from 10.84% in 1901 to 31.16% in 2011, which indicates faster growth of urban population. One of the conspicuous feature of urbanization in India is the skewed distribution of population with as much as 42.6% of urban population in 53 metro cities alone. Unregulated growth of urban areas, particularly over the last two decades, with inadequate infrastructural services for proper collection, transportation, treatment and disposal of domestic wastes led to increased pollution & health hazards. The municipalities and such other civic authorities have not been able to cope up with this massive task which could be attributed to various reasons including erosion of authority, inability to raise revenues and inadequate managerial capabilities. That is why it became necessary to launch the Ganga Action Plan and subsequently the National River Action Plan, which is essentially addressed to the task of trapping, diversion and treatment of municipal wastewater. The situation warrants immediate redress through radically improved water resource and water quality management strategies.

Water quality monitoring is performed under the provision of Water (Prevention and Control of Pollution) Act, 1974. The basic objective of this Act is to maintain and restore the wholesomeness of national aquatic resources by prevention and control of pollution. The Central Pollution Control Board (CPCB) has tried to define the wholesomeness in terms of protection of human uses, and thus, taken human uses of water as base for identification of water quality objectives for different water bodies in the country. Water quality data provide basis for assessment of environmental status of water bodies vis-a-vis identified water quality objectives. Besides National

monitoring programme, specific objective oriented water quality monitoring is also carried out.

5.1.2 National Water Quality Monitoring Programme (NWQMP)

Main objectives of NWQMP include:

(i) Rational planning of pollution control strategies and their prioritisation;
(ii) Evaluation of effectiveness of existing pollution control measures;
(iii) Analysing water quality trend over a period of time;
(iv) Assessment of assimilative capacity of a water body to reduce cost on pollution control; and
(v) Understanding environmental fate of different pollutants; and assessment on the fitness of water for different uses.

In order to plan policies for prevention and control of pollution, Central Pollution Control Board in collaboration with State Pollution Control Boards had established a Nation-wide Water Quality Monitoring Network.

The present network comprises of 2500 stations in 28 States and 6 Union Territories spread over the country. The monitoring network covers 445 Rivers, 154 Lakes, 12 Tanks, 78 Ponds, 41 Creeks/Seawater, 25 Canals, 45 Drains, 807 Wells and 10 Water Treatment Plants (Raw water). The distribution of 2500 stations among various types of water bodies are as follows:

Table 5.1: Distribution of Monitoring Stations

Water Body	No. Of Monitoring Stations
Rivers	1275
Lakes	190
Drains	45
Canals	41
Tank	12
Creeks/seawater	41
Pond	79
Groundwater	807
Water Treatment Plants (Raw water)	10

Presently the inland water quality-monitoring network is operated under three-tier programme i.e. Global Environmental Monitoring System (GEMS), Monitoring of Indian National Aquatic Resources System (MINARS) and Yamuna Action Plan (YAP).The water samples are analyzed for 9 core parameters and 19 general

parameters. The trace metals are analized at few locations. The monitoring is done on monthly basis in surface waters comprising of Rivers, lakes, tanks, ponds, creeks/sea water, canals & drains and on half yearly basis in case of ground water.

5.1.3 Water Quality Trend

The water quality trend during 1995 to 2011 indicate that the organic and bacterial contamination continue to be critical in water bodies. This is mainly due to discharge of (untreated) domestic wastewater from the urban centres. The municipal corporations at large have not been able to treat increasing load of municipal sewage flowing into the water bodies. Secondly, the receiving water bodies also do not have adequate water for dilution.

The water quality monitoring data were analysed with respect to Bio-chemical Oxygen Demand (BOD), an indicator of oxygen consuming substance and indicators for pathogenic bacteria, Total coliform and Faecal coliform. The result of such analysis shows that there is gradual degradation in water quality. Water quality trend for the period 1995- 2011 with regard to BOD, Total coliform and Faecal coliform are given in Figures 5.1 through 5.3, in terms of number of observations under different concentration ranges.

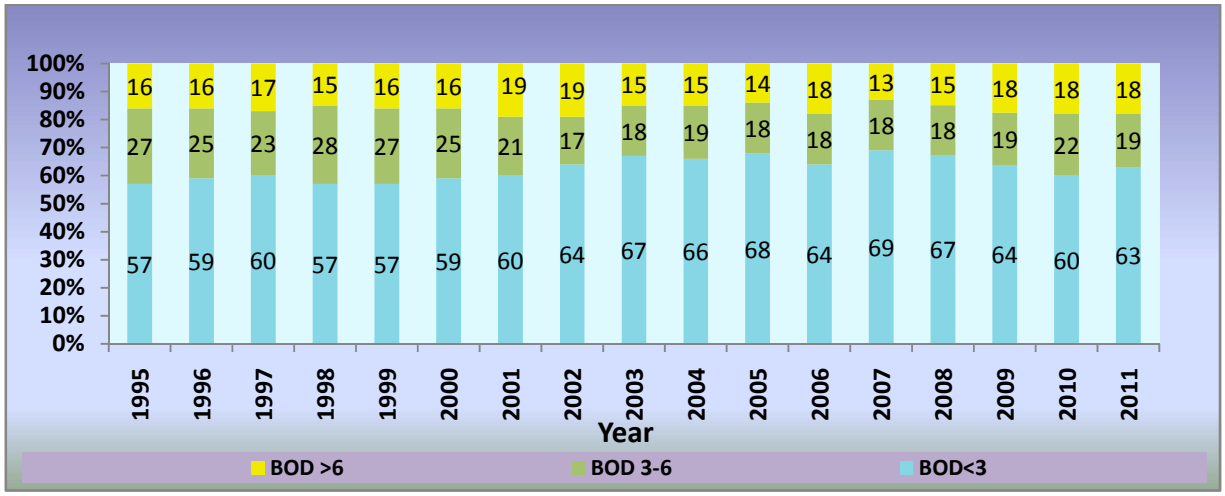


Figure 5.1: Water Quality Trend (BOD, mg/l)

The number of observed BOD values < 3 mg/l, 3-6 mg/l and > 6 mg/l were between 57-69%, 17-18% and 13-19% respectively during year 1995 to 2011.

There is no distinct trend observed as multiple factors such as discharged pollution load, water flow, monitoring frequency etc. influence the water quality.

However, BOD values less than 3 mg/l showed increasing trend till year 2007 and gradual decrease thereafter, which indicate deterioraship water quality. The BOD concentration values between 3-6 mg/l and >6 mg/l ranges got decreased from 2001-2002 and remained more or less stable with slight increase after year 2008.

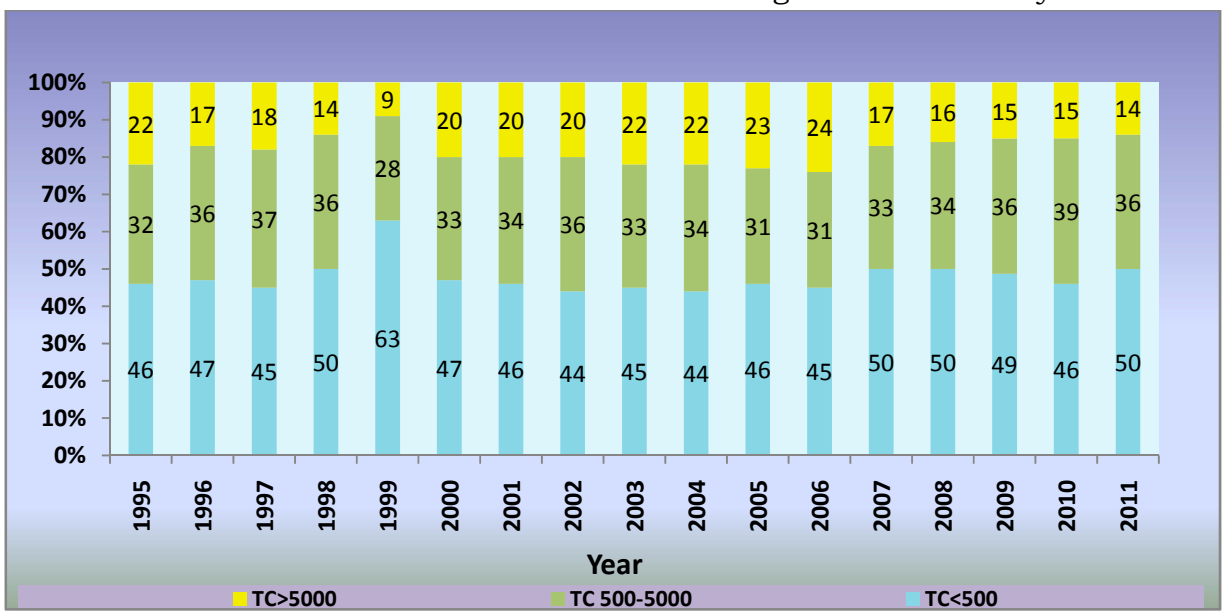


Figure 5.2: Water Quality Trend (Total Coliform, MPN/100 ml)

The number of observed total Coliform values <500, 500-5000 and >5000 MPN/ 100 ml, were 44-63%, 28-39% and 9-24% respectively during year 1995-2011. Trends indicate improvement in water quality for total and fecal coliform, less number of observations with values in the higer range particularly after year 2007.

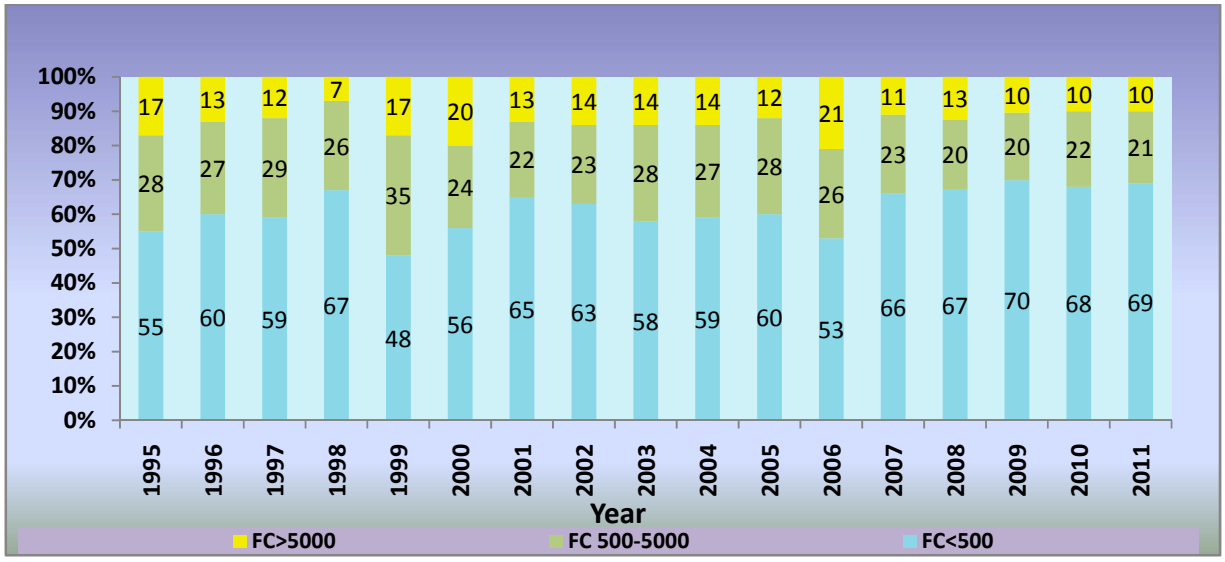


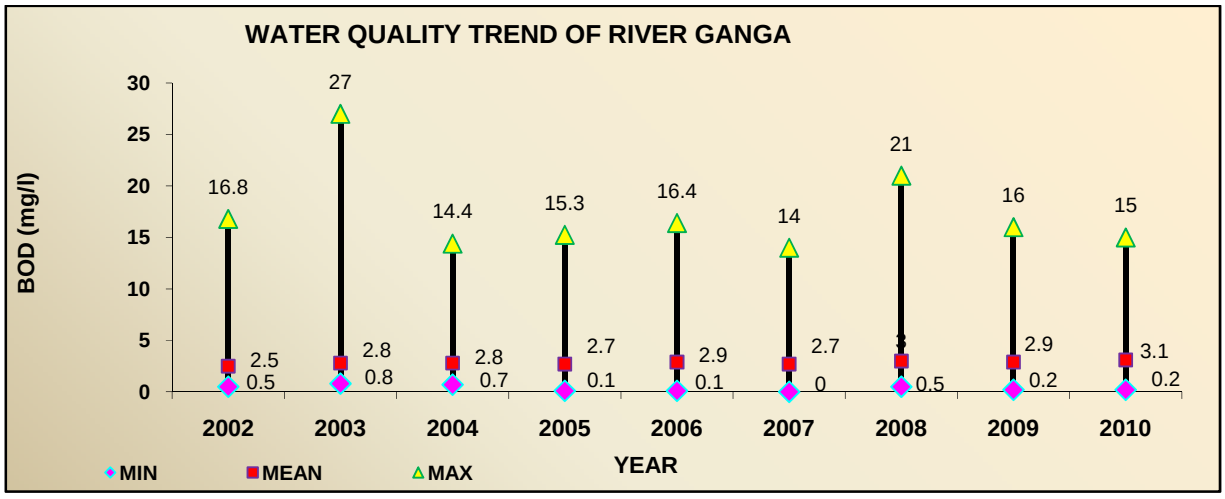
Figure 5.3: Water Quality Trend (Faecal Coliform, MPN/100 ml)

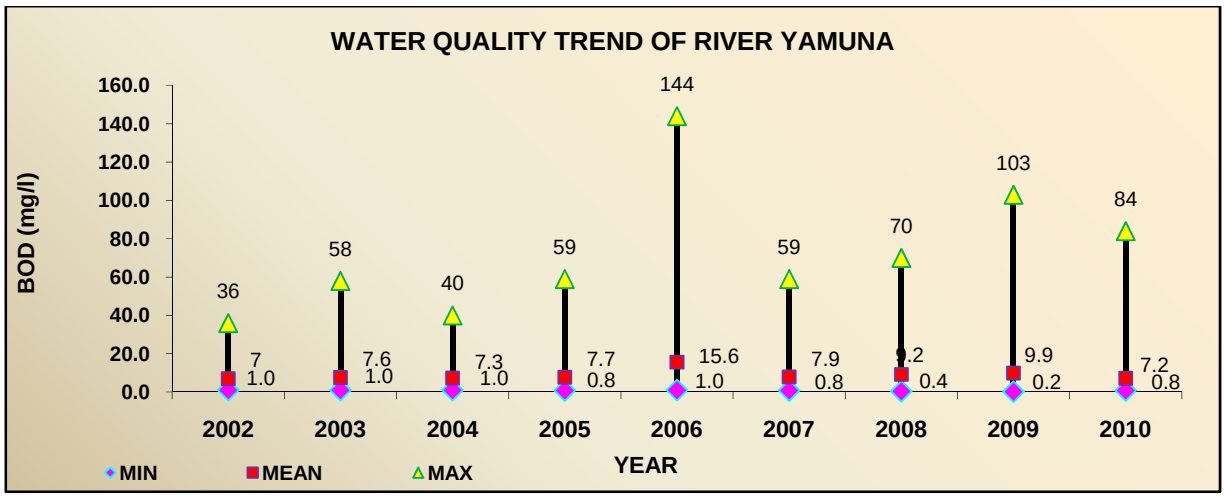
The number of observed Faecal Coliform values <500, 500-5000, > 5000 MPN/100 ml were 48-70%, 20-35% and 7-21% during year 1995-2011.

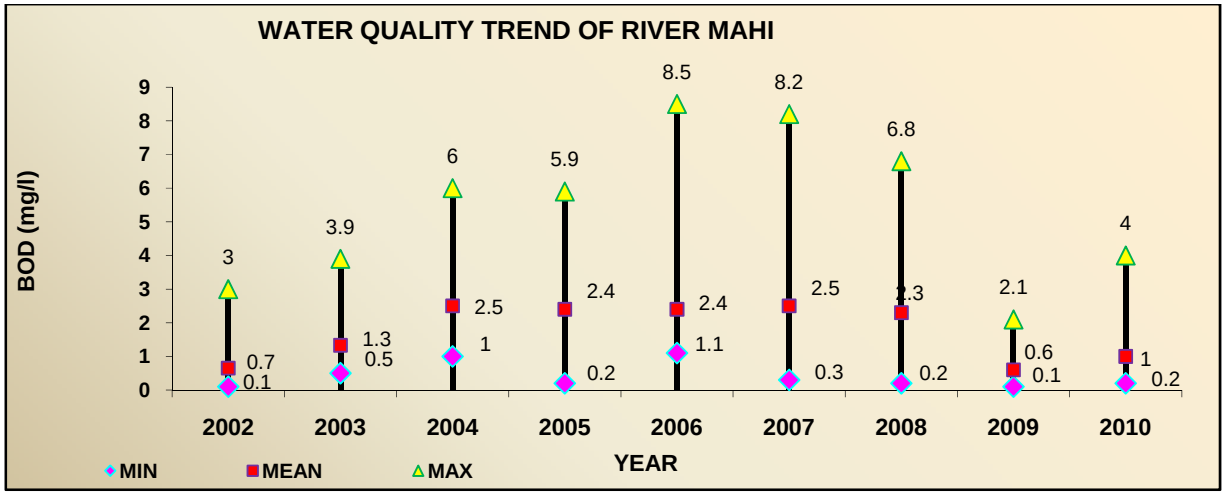
5.1.3.1 Water Quality trend of BOD for major Rivers

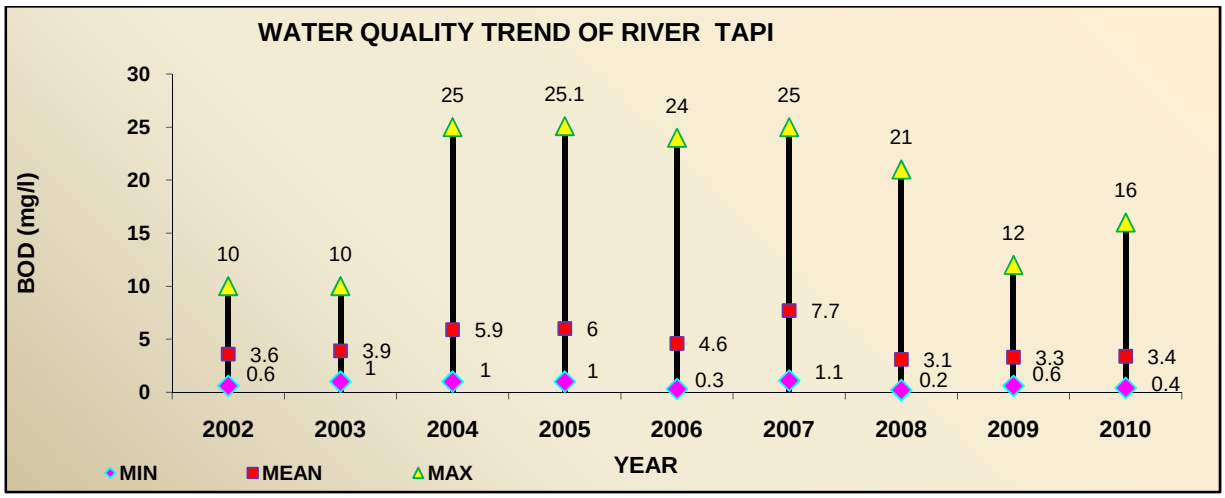
The Water Quality trend of BOD in River Ganga, Yamuna, Mahi, Tapi, Godavari, Krishna, Cauvery, Mahanadi, Brahmani, Baitarni, Subarnarekha, Brahmaputra, Satluj, Beas, Pennar and Narmada depicting the data from year 2002 to 2010 is presented in figure 5.4.

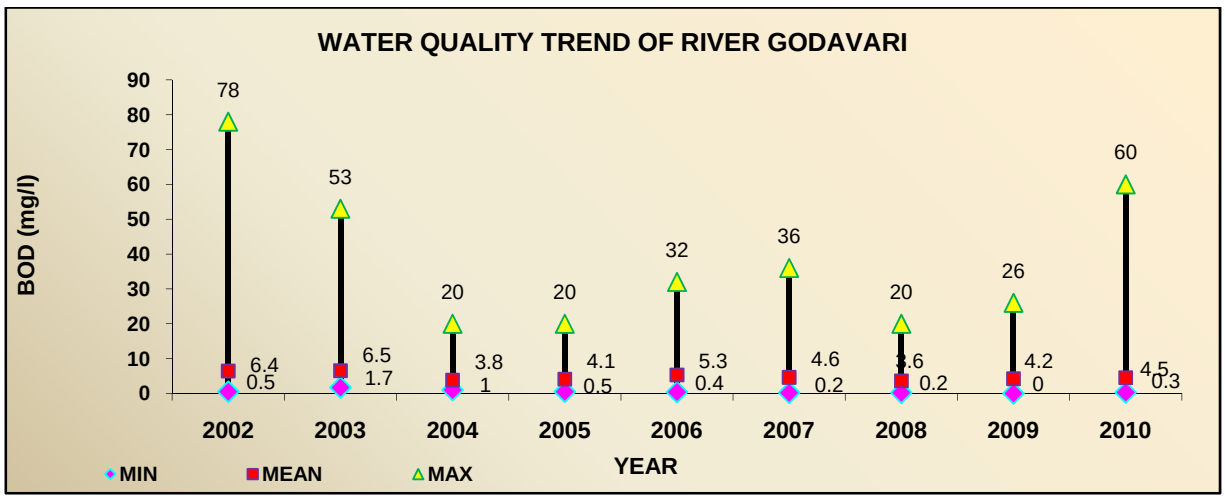
Figure 5.4: Water Quality Trend in terms of Biochemical Oxygen Demand (BOD mg/l) in major Rivers

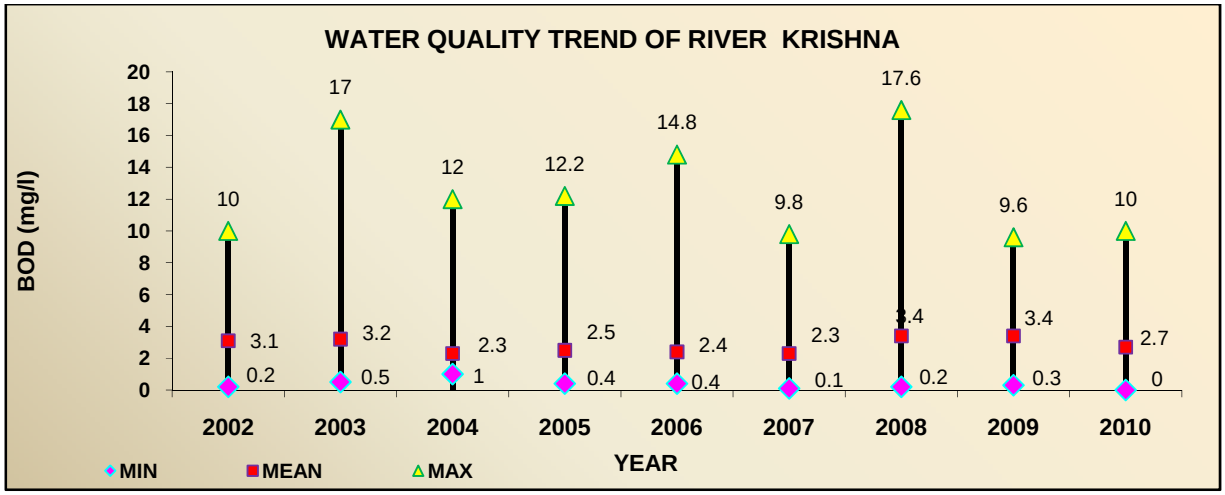


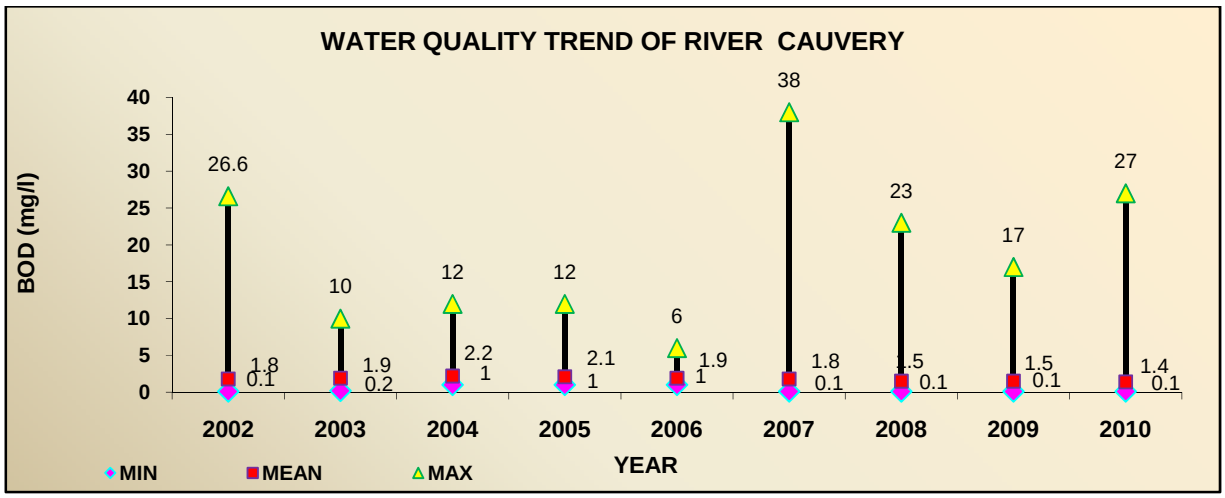


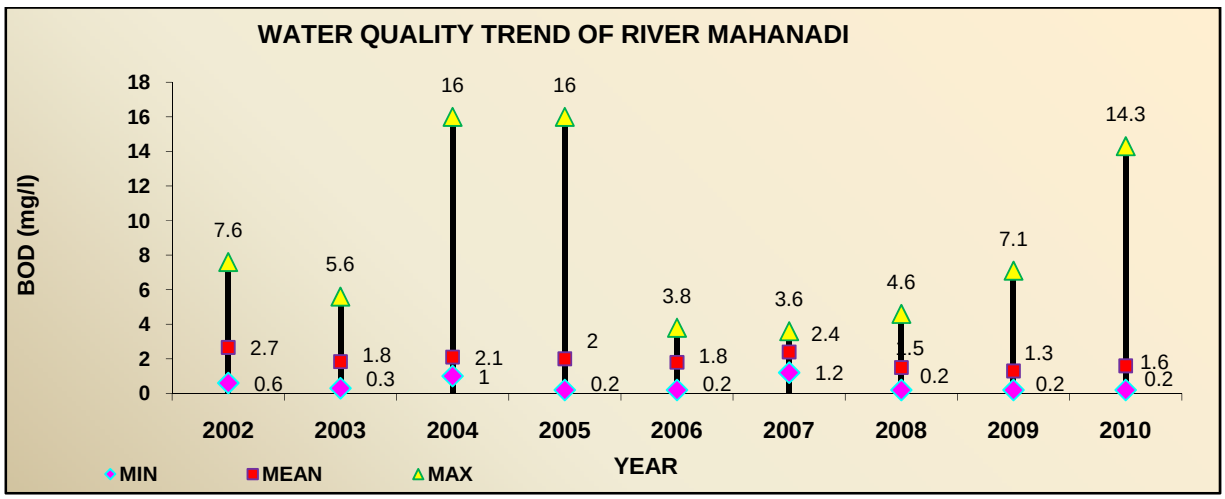

WATER QUALITY TREND OF RIVER MAHI
BOD (mg/l)
YEAR
MIN
MEAN
MAX
2002
2003
2004
2005
2006
2007
2008
2009
2010
3
0.7
0.1
3.9
1.3
0.5
6
2.5
1
5.9
2.4
0.2
8.5
2.4
1.1
8.2
2.5
0.3
6.8
2.3
0.2
2.1
0.6
0.1
4
1
0.2

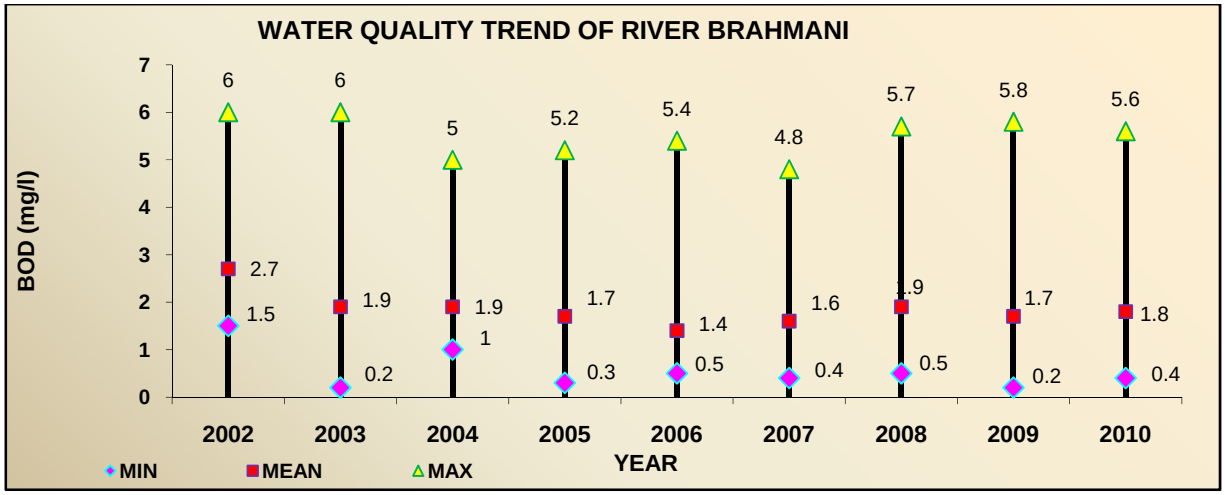

WATER QUALITY TREND OF RIVER TAPI
BOD (mg/l)
YEAR
MIN
MEAN
MAX
2002
2003
2004
2005
2006
2007
2008
2009
2010
10
3.6
0.6
10
3.9
1
25
5.9
1
25.1
6
1
24
4.6
0.3
25
7.7
1.1
21
3.1
0.2
12
3.3
0.6
16
3.4
0.4

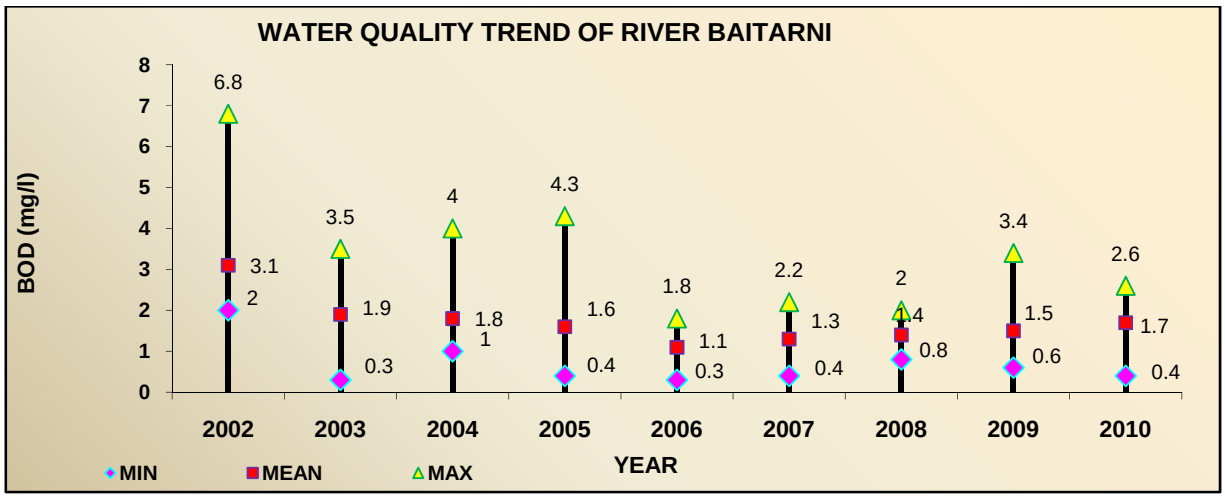

WATER QUALITY TREND OF RIVER GODAVARI
BOD (mg/l)
YEAR
MIN
MEAN
MAX
2002
2003
2004
2005
2006
2007
2008
2009
2010
78
6.4
0.5
53
6.5
1.7
20
3.8
1
20
4.1
0.5
32
5.3
0.4
36
4.6
0.2
20
3.6
0.2
26
4.2
0
60
4.5
0.3

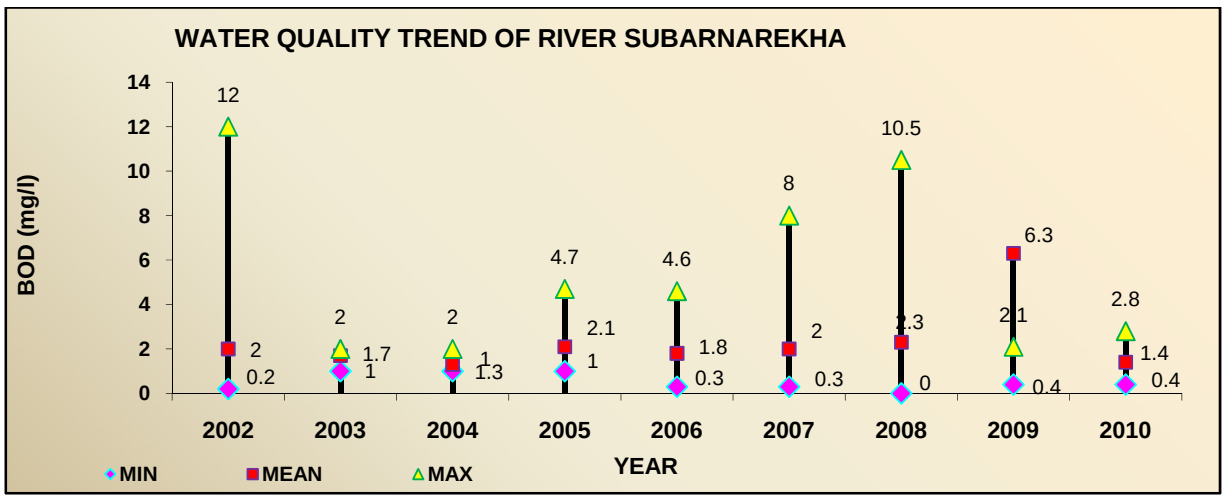

WATER QUALITY TREND OF RIVER KRISHNA
BOD (mg/l)
20
18
16
14
12
10
8
6
4
2
0
10
17
12
12.2
14.8
9.8
17.6
9.6
10
3.1
3.2
2.3
2.5
2.4
2.3
3.4
3.4
2.7
0.2
0.5
1
0.4
0.4
0.1
0.2
0.3
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
YEAR
MIN
MEAN
MAX

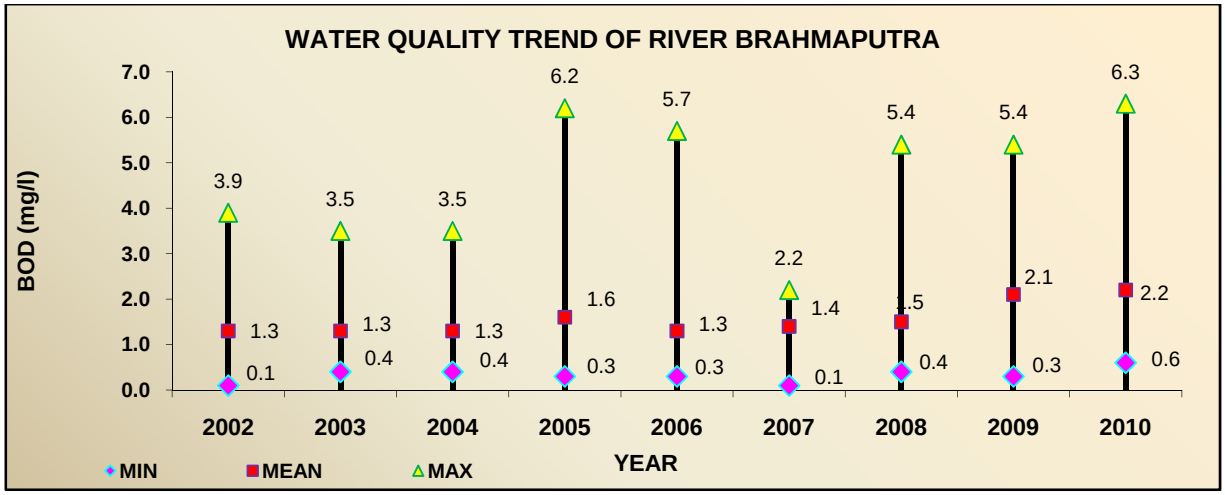

WATER QUALITY TREND OF RIVER CAUVERY
BOD (mg/l)
40
35
30
25
20
15
10
5
0
26.6
10
12
12
6
38
23
17
27
1.8
1.9
2.2
2.1
1.9
1.8
1.5
1.5
1.4
0.1
0.2
1
1
1
0.1
0.1
0.1
0.1
2002
2003
2004
2005
2006
2007
2008
2009
2010
YEAR
MIN
MEAN
MAX

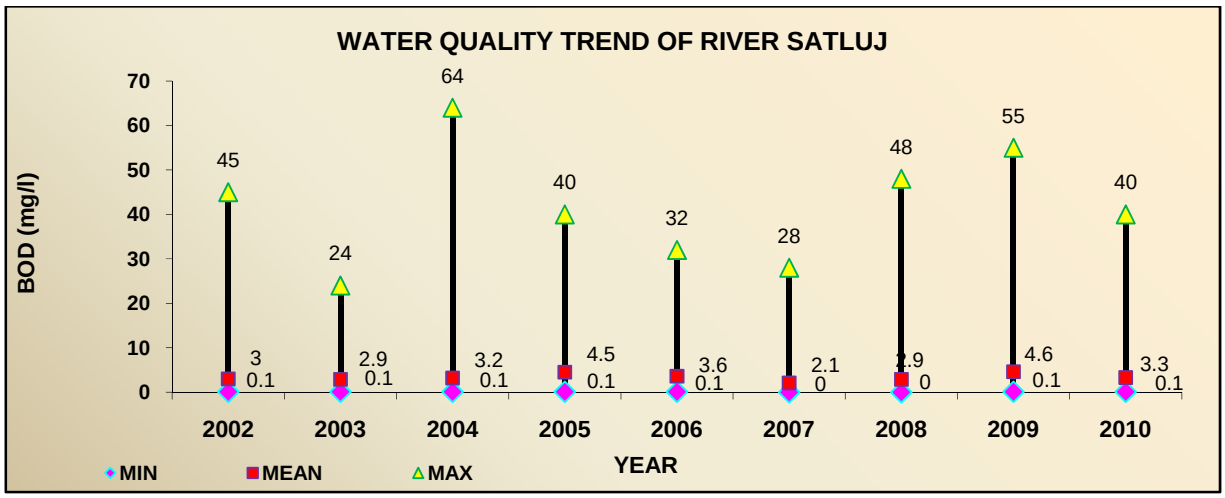

WATER QUALITY TREND OF RIVER MAHANADI
BOD (mg/l)
18
16
14
12
10
8
6
4
2
0
7.6
5.6
16
16
3.8
3.6
4.6
7.1
14.3
2.7
1.8
2.1
2
1.8
2.4
1.5
1.3
1.6
0.6
0.3
1
0.2
0.2
1.2
0.2
0.2
0.2
2002
2003
2004
2005
2006
2007
2008
2009
2010
YEAR
MIN
MEAN
MAX

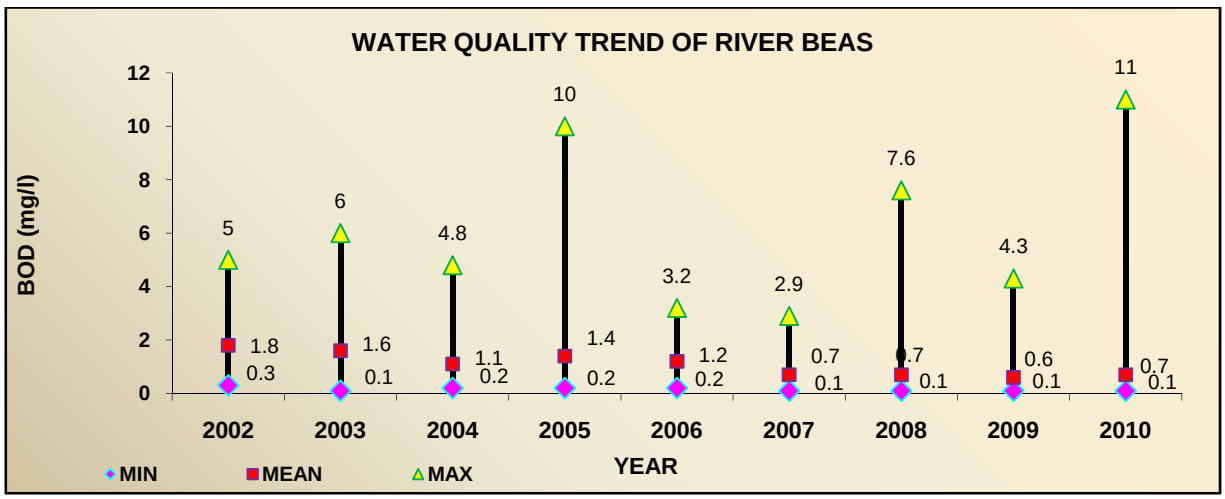

WATER QUALITY TREND OF RIVER BRAHMANI
BOD (mg/l)
YEAR
MIN
MEAN
MAX
2002 2003 2004 2005 2006 2007 2008 2009 2010
6 6 5 5.2 5.4 4.8 5.7 5.8 5.6
2.7 1.9 1.9 1.7 1.4 1.6 1.9 1.7 1.8
1.5 0.2 1 0.3 0.5 0.4 0.5 0.2 0.4


WATER QUALITY TREND OF RIVER BAITARNI
BOD (mg/l)
YEAR
MIN
MEAN
MAX
2002 2003 2004 2005 2006 2007 2008 2009 2010
6.8 3.5 4 4.3 1.8 2.2 2 3.4 2.6
3.1 1.9 1.8 1.6 1.1 1.3 1.4 1.5 1.7
2 0.3 1 0.4 0.3 0.4 0.8 0.6 0.4


WATER QUALITY TREND OF RIVER SUBARNAREKHA
BOD (mg/l)
YEAR
MIN
MEAN
MAX
2002 2003 2004 2005 2006 2007 2008 2009 2010
12 2 2 4.7 4.6 8 10.5 6.3 2.8
2 1.7 1 2.1 1.8 2 2.3 2.1 1.4
0.2 1 1.3 1 0.3 0.3 0 0.4 0.4


WATER QUALITY TREND OF RIVER BRAHMAPUTRA
BOD (mg/l)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
3.9
3.5
3.5
6.2
5.7
2.2
5.4
5.4
6.3
1.3
1.3
1.3
1.6
1.3
1.4
1.5
2.1
2.2
0.1
0.4
0.4
0.3
0.3
0.1
0.4
0.3
0.6
2002
2003
2004
2005
2006
2007
2008
2009
2010
YEAR
MIN
MEAN
MAX


WATER QUALITY TREND OF RIVER SATLUJ
BOD (mg/l)
70
60
50
40
30
20
10
0
45
24
64
40
32
28
48
55
40
3
2.9
3.2
4.5
3.6
2.1
2.9
4.6
3.3
0.1
0.1
0.1
0.1
0.1
0
0
0.1
0.1
2002
2003
2004
2005
2006
2007
2008
2009
2010
YEAR
MIN
MEAN
MAX


WATER QUALITY TREND OF RIVER BEAS
BOD (mg/l)
12
10
8
6
4
2
0
5
6
4.8
10
3.2
2.9
7.6
4.3
11
1.8
1.6
1.1
1.4
1.2
0.7
0.7
0.6
0.7
0.3
0.1
0.2
0.2
0.2
0.1
0.1
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2002
2003
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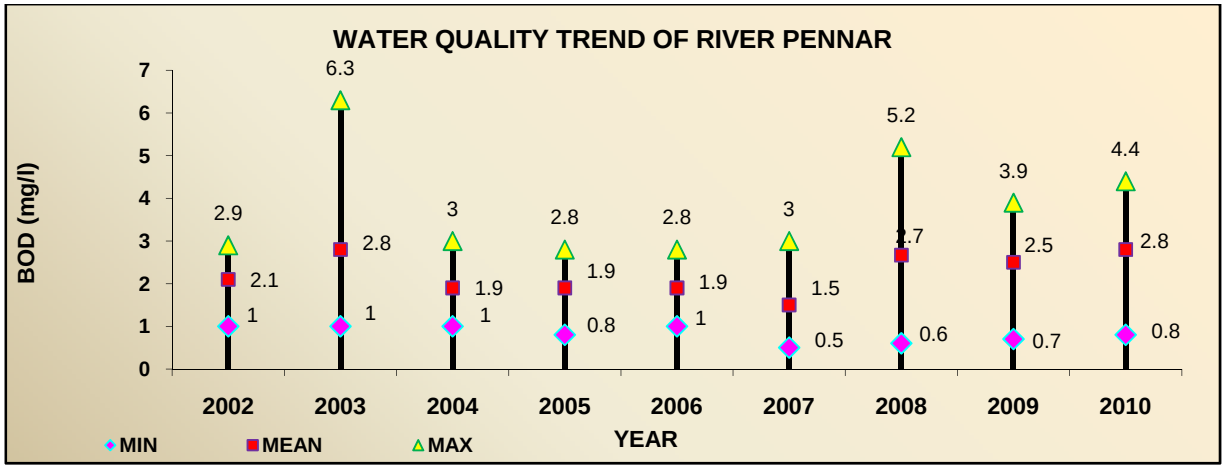
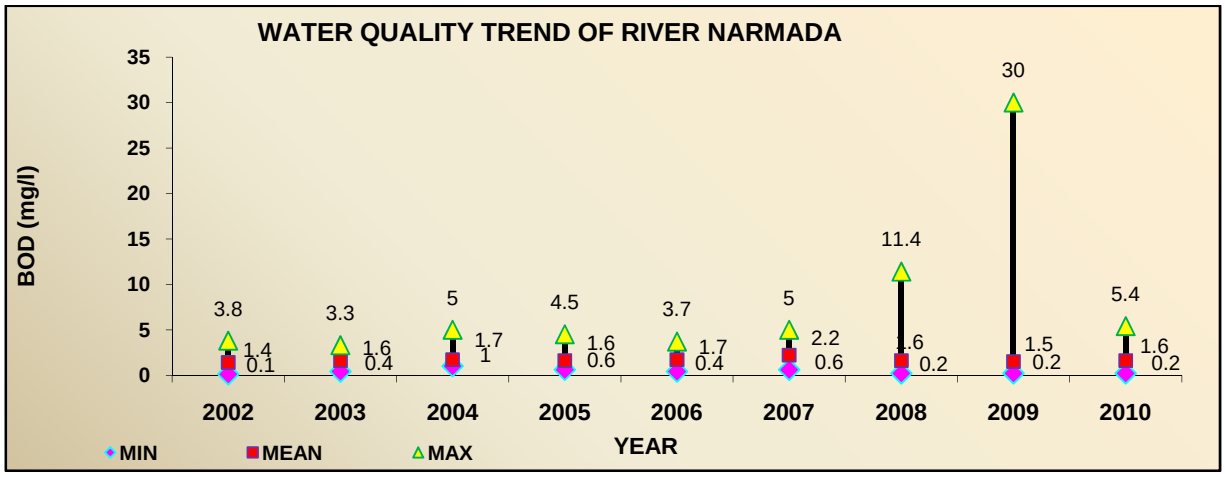
2009
2010
YEAR
MIN
MEAN
MAX





5.1.4 Water Quality at a Glance

The water quality data on rivers, lakes, ponds, tanks and groundwater locations monitored under the Water Quality Monitoring network are evaluated against the water quality criteria. The monitoring locations in exceedence with respect to one or more parameters are identified as polluted, which require action for restoration of water quality.

The monitoring results obtained during year 2010 indicate that organic pollution continues to be the predominant pollution of aquatic resources. The organic pollution measured in terms of bio-chemical oxygen demand (BOD) & Coliform bacterial count gives indication of extent of water quality degradation. It is observed that nearly 60% of the observations have BOD less than 3 mg/l, 22% between 3 to 6 mg/l and 18% above 6 mg/l. Total & Faecal coliform, which indicate presence of pathogens in water, have about 46% of Total Coliforms and 68% observations respectively with values less than 500 MPN /100 ml.

5.1.5 Water Quality of Rivers

- **Indus Catchment:** Water quality of River Beas at upstream Mandi & downstream Manali in Himachal Pradesh and river Satluj at downstream Budhanala Confluence, Ludhiana; Boat Bridge Dharmkotnakodar Road, Jalandhar; Downstream of Zenith; Downstream of East Bein and Upstream Budhanala in Punjab was found to be deteriorated as compared to stipulated requirement.

- **Ganga Catchment:** Water quality of River Ganga did not meet the criteria at monitoring locations on River Alaknanda, Mandakini, Bhagirathi and in the stretch of River from Raiwala Downstream to Ghazipur (Trighat), at Dakshineshwar and at Howrah-Shivpur. In case of River Yamuna water quality exceeded the criteria at upstream Dak Patthar and from Nizamuddin to Allahabad stretch. The water quality of tributary streams River Ramganga, Gomti, Rapti, Varuna, Saryu, Ghaghra, Harbora, Sai, Sirsa, Suswa, Kali Nadi (East), Kali Nadi (West), Hindon, Betwa, Kolar, Chambal, Khan, Kshipra, Bichia, Tons (MP), Damodar, Barakar, Dwarakeshwar, Dwarka, Churni, Matha Bhanga, Kansi, Mahananda and Vindyadhari did not conform to water quality criteria at their various monitoring locations.

- **Brahmaputra Catchment:** The mainstream of River Brahmaputra exceeded the criteria at Nimatighat, Sualkuchi Kamrup, Sualkuchi, Dist. Kamrup, Kacharighat (Guwahati), Dhenukhapahar, Pandu, Jogijhoga Near Bridge, Dibrugarh and Kherghat in Assam. The tributary streams Bharalu, Dhansiri, Digboi, Deeparbil, Disang, Burhiding, Mora Bharali, Kolong, Manas, Teesta, Dikchu, Ranichu, Maney Khola, Kundli, Dzu, Nagarjan, Kaljani, Rangit, Dam Site, Reshi, Treveni, Lagship, Jorethang, Basti, Bhogdoi, Borak, Beki, Maney Khola, Burhidihing, Boginadi, Kohora, Subansiri and Kathakal are also polluted and not conforming to the desired criteria. River Dhansiri did not meet the desired criteria at Full Nagarjan, Purana Bazaar, Dimapur Khutkhuti Road, Nuton Basti, Town boundary bridge, Nagaland-Assam Border and Golaghat, River Chathe at Medziphema, River Dzu downstream Kohima Town, River Bharalu (Guwahati), River Kharsang Before confluence Buridihing near Kharsang and Jhanji at Jorhat, River Sankosh at Dhubri, River Teesta after confluence of Rivers Lachenchu and Lachungchu at Chungthaang, after confluence Ranichu, Melli Downstream and Siliguri, River Kapili at Dharmtul Bridge, Nagaon, River Kundli at Sapakhowa, River Dikhow at Dikhow Bridge (Sivasagar).

- **West Flowing Rivers (Mahi- Sabaramati-Narmada-Tapi) Catchment:** River Mahi was found to be conforming to the desired water quality at most of the monitoring locations except Mujpur and Mahi (Downstream) confluence with River

Chap (Under Sagwara-Sarhi Road Bridge), River Shivna at Ramghat, Mandsaur, River Jammer at Dholowad, Ratlam, River Malei at Jaora and River Chillar at Shajapur in Gujarat. River Sabarmati did not conform to the desired water quality criteria downstream of Dharaoi dam. The mainstream of River Narmada and tributary streams conform to water quality for all the criteria parameters except pH and BOD, which are exceeding at Hoshangabad Upstream & Downstream, Sethanighat, Korighat, Hoshangabad and Nemawar, Garudeshwar, Panetha, River Kunda at Khargone and River Gour Bhoga Door at Jabalpur. The water quality of River Narmada is broadly meeting the criteria for beneficial uses.

The water quality of mainstream of river Tapi exceeded criteria limits at Burhanpur & Nepa Nagar after Meeting Pandhar Nalla in Madhya Pradesh, Ajnand Village, Bhusawal Upstream and Uphad village in Maharashtra; ONGC Bridge, Surat, Kathore- NH-8 Bridge, Rander Bridge, Upstream Kathore and Mandavi in Gujarat. Water quality of tributary streams Girna at Malegaon & Jalgaon, Rangavali at Navapur, Kim at Sahol Bridge, River Denwa near Sarni, Road Bridge and River Purna after confluence of Morna, Nandura Village also did not meet the desired water quality criteria.

- **East Flowing Rivers (Mahanadi-Brahmani-Baitarni-Subarnarekha) Catchment:** The water quality of mainstream of Mahanadi did not meet the criteria with respect to BOD at Cuttack Upstream & Downstream and Sambhalpur Downstream in Orissa. Conductivity exceeded the desired criteria at Paradeep Upstream & Downstream. Faecal Coliform values exceeded the criteria at Sambalpur Downstream, Sambhalpur at Huma and Cuttack Downstream. Total Coliform did not meet the criteria at Sambalpur Downstream, Sambhalpur at Huma and Cuttack Downstream. Tributary streams Kathajodi at Cuttak Downstream & Kuakhai at Bhubaneshwar Upstream, Bhubaneshwar Downstream and Bhubaneshwar Downstream in Orissa; Kelo River Downstream of Raigarh in Chhattisgarh did not meet the criteria limit in respect of BOD. Faecal Coliform & Total Coliform values exceeded the criteria at Bhubaneshwar Downstream & Downstream, River at Brajrajnagar (Intake) Downstream and Jharsuguda (Intake). Low values of Dissolved Oxygen was observed in River Daya at Bhubaneswar after confluence of Gangua Nallah.

The water quality of mainstream of Brahmani with respect to BOD exceeded the criteria limit at Panposh downstream and Rourkela downstream in Odisha, and Faecal Coliform & Total Coliform values exceeded the criteria limit at Downstream Panposh, Downstream Rourkela, Rengali, Talcher, Dhenkanal downstream, Bonaigarh, Kabatabandha (Before) impact of industrial activity in Kalinganagar Area), Pattamundai, Bhuban, Dharmashala and Kamalanga in Odisha. The water

quality of tributary stream River Kharasrota at Aul did not comply with the desired criteria with respect to Faecal Coliform & Total Coliform.

The water quality of major tributary stream Baitarni did not comply with the criteria in respect of conductivity at Dhamra & Chandbali due to estuarine region of the river whereas Faecal Coliform & Total Coliform did not meet the criteria at Jajpur, Chandbali, Anandpur and Dhamra.

The water quality of river Subarnarekha did meet the criteria limit at all locations.

- **Peninsular rivers (Godavari-Krishna-Pennar-Cauvery) Catchment:** The water quality of river Godavari in respect of BOD did not meet the criteria in Maharashtra at all locations due to proximity of large cities. In Andhra Pradesh water quality of mainstream of Godavari exceeded the criteria limit with respect to BOD at Godavarikhani, Mancherial near Railway Bridge, Ramagundam Upstream & Downstream, Ramagundam Downstream (Near FCI Intake Well), Mancherial, Burgam Pahad (Khammam), Bhadrachalam Downstream and Basara (Adilabad). Dhalegaon, Nasik Downstream, Panchavati (Ramkund), Kapila-Godavari confluence point (Tapovan), Tapovan, Hanumanghat (Nasik), Near Someshwar Temple, Saikheda, Downstream & Upstream of Paithan, Jalna Intake Water Pump House (Shahabad), Upstream Aurangabad, Nanded, Jayakwadi Dam (Aurangabad), Nandur- Madmeshwar Dam, Latur Water Intake near Pump House (Dhamegaon), Raher and Upstream of Gangapur Dam (Nasik) in Maharashtra did not meet the criteria for BOD. Tributary streams Wardha, Wainganga, Bindusara, Manjeera, Kolar, Purna, Kanhan, Wena, Darna, Nira, Penganga and Maner at Warangal upstream exceeded the water quality criteria at some locations.

The water quality of river Krishna did not meet the water quality criteria at Kurundwad (Kolhapur), Wai, Krishna-Venna Sangam at Mahuli, Kshetra Mahuli, Krishna Bridge (Karad), Mahabaleshwar Dhom Dam, Sangli in Maharashtra; Ankali Bridge, Tintini Bridge, Upstream of Ugarkhurd Barrage in Karnataka and Gadwal Bridge, Wadapally after confluence with Musi, after confluence Tungabhadra (Sangameshwaram), Hamsala Deevi (Guntur) in Andhra Pradesh. Conductivity did not meet the criteria at Hamsala Deevi in Andhra Pradesh due to estuarine region. pH, Faecal Coliform and Total Coliform meet water quality criteria in River Krishna at all the locations. The water quality of tributary streams Panchganga & Bhima did not meet the desired water quality criteria with respect to DO, BOD, Faecal Coliform and Total Coliform. The tributary streams Malprabha, Musi, Nakkavagu, Kundu, Tunghabhadra, Bhadra, Tungha, Kagina, Nira, Mula, Mula-Mutha, Mutha and Pawana did not meet the desired water quality criteria. The water quality of river Pennar meet the desired water quality

criteria with respect to pH, DO, Conductivity, Fecal Coliform and Total Coliform. BOD was observed more than the criteria at all locations.

The Water Quality of River Cauvery did not meet the desired water quality criteria at Thirumukkudal, Coleroon, Downstream of Bhavani River Confluence, Erode near Chirapalayam, Tiruchirappalli Upstream, Trichy (Grand Anaicut), Pallippalayam, Mohanur near Pattaipalayam, Pitchavaram, Velore near Kattipalayam and Mettur. The tributary streams not meeting the criteria are Thirumanimuthar at Salem, Vasista at Salem, Bhavani at Bhavani & Pathirakaliamman koil, Sarabanga at Salem and Arkavathi at Downstream of Kanakapura Town.

The aquatic resources monitored for water quality at State/UT level are assessed for compliance of pollutants such as pH, Conductivity, Dissolved Oxygen, Bio chemical Oxygen Demand, Total Coliform and Fecal Coliform to their desired levels. State wise violation data for various Water Quality parameters are provided in Table 5.2).

Table 5.2 : State wise Percent violation for various water quality parameters

State	Dissolved Oxygen			pH			Conductivity			BOD			Fecal Coliform			Total Coliform		
	violating records	Count	% Violation	violating records	Count	% Violation	violating records	Count	% Violation	violating records	Count	% Violation	violating records	Count	% Violation	violating records	Count	% Violation
Andhra Pradesh	70	596	11.7	21	639	3.29	75	639	11.7	269	632	42.6	0	554	0	3	633	0.5
Assam	14	314	4.5	0	315	0	3	313	1	158	315	50.2	0	313	0	0	314	0
Bihar	2	211	1	0	211	0	0	211	0	23	211	10.9	48	211	22.75	53	211	25.1
Chhattisgarh	0	156	0	0	156	0	0	136	0	3	120	3	0	1	0	0	155	0
Daman & Diu	2	23	9	0	23	0	9	23	39	7	7	100	0	4	0	0	3	0
Delhi	34	51	67	0	145	0	0	53	0	129	140	92	46	51	90	51	51	100
Goa	2	168	1	0	173	0	1	173	1	11	168	7	0	96	0	0	128	0
Gujarat	13	226	6	0	240	0	22	238	9	59	235	25	27	237	11	46	240	19
Haryana	5	48	10	0	58	0	0	48	0	23	53	43	15	23	65	22	23	96
Himachal Pradesh	2	262	1	0	268	0	0	267	0	6	255	2	5	251	2	15	255	6
J&K	0	7	0	1	7	14	0	7	0	4	7	57	0	1	0	0	1	0
Jharkhand	0	156	0	0	156	0	0	53	0	0	156	0						
Karnataka	2	358	1	45	354	13	1	311	0.32	68	337	20	39	355	11	49	358	14
Kerala	59	441	13	93	442	21	44	442	10	35	442	8	19	442	4	38	442	9
Madhya Pradesh	16	309	5	9	424	2	29	406	7	112	327	34	0	260	0	0	282	0
Maharashtra	183	1376	13	148	1446	10	121	1447	8	1257	1447	87	0	1422	0	0	1419	0
Meghalaya	0	32	0	1	32	3	1	32	3	16	32	50	9	32	28	0	32	0
Manipur	8	57	14	2	57	4	0	57	0	9	57	16				0	57	0
Mizoram	0	16	0	1	16	6	0	16	0	0	16	0	0	8	0	0	8	0
Nagaland	20	32	63	0	32	0	0	32	0	0	32	0						
Odisha	3	512	1	17	512	3	33	512	6	69	512	13	108	512	21	129	512	25
Puducherry	0	6	0	2	6	33	0	6	0	1	5	20						

Punjab	6	141	4	16	141	11	0	141	0	68	140	49	54	136	40	59	141	42
Rajasthan	13	80	16	15	80	19	4	80	5	10	80	13	0	76	0	0	80	0
Sikkim	0	168	0	93	168	55	0	168	0	141	168	84	0	168	0	0	168	0
Tamilnadu	13	282	5	12	282	4	1	281	0	46	282	16	8	281	3	7	281	2
Tripura	3	28	11	2	28	7	0	28	0	17	28	61	0	28	0	0	28	0
Uttar Pradesh	49	560	9	17	590	3	0	546	0	420	579	73	327	530	62	357	533	67
Uttarakhand	6	122	5	14	122	11	0	122	0	36	99	36	19	52	37	40	62	65
West Bengal	27	257	11	13	259	5	22	260	8	107	260	41	198	256	77	260	257	101

5.2 WATER QUALITY STATUS OF YAMUNA RIVER

Water Quality of Yamuna River is regularly being monitored by Central Pollution Control Board at 22 locations covering almost entire river stretch (Yamunotri to Hamirpur). The water quality trend of the river during the last five years (2007-2011) in terms of annual mean of three critical parameters i.e. Dissolved Oxygen (DO), Bio chemical Oxygen Demand (BOD) and Total Coliform (TC) is depicted in Figure 5.5 to 5.7. The values of DO as observed during the year 2010 reflects that the level of this parameter was well above the desired limit from origin of the river till Palla (upstream of Delhi) and ranges from 5.0 – 9.4 mg/l. DO in the river depletes significantly after Wazirabad barrage and remains critical most of the times till Mathura U/s. No DO is observed in the river stretch from Wazirabad D/s to Okhla barrage D/s except during rainy seasons. Values of DO from Nizamuddin Bridge to Mathura upstream are in the range of 0.0 – 8.0 mg/l. Improvement in DO level noticed at Mathura U/s and Agra U/s with the values ranging between 2.1 to 7.2 mg/l. The DO again depletes at Agra stretch of the river with values ranging from 0.0 to 6.3 mg/l. After Agra DO generally meets the desired level and its value ranged between 0.0-17.0 mg/l. At few locations high DO (above 8 mg/l) was also observed which reflects eutrophic conditions caused by excessive growth of algae in presence of high amount of nutrients which get released in the river water after decomposition of organic matters. Similar to DO, BOD also meets the desired level from Yamunotri to Palla except occasional violations at Sonepat and Palla. The level of BOD in this river stretch varies from Below detection limit to 4 mg/l. After Wazirabad barrage BOD generally violates the prescibed standards till Auraiya with the variation in values from 1 to 59 mg/l (Okhla after Shahdara drain). TC meets the desired level at Yamunotri and Shyanachetti with values of 90 and 930 MPN/100 ml respectively. At downstream locations this parameter occasionally confirms the level till Palla with values ranging between 210 to 1600000 MPN/100 ml. In rest of the river stretch, TC level exceeds and violates the standards.

The reason of deterioration of Yamuna River water quality especially after wazirabad barrage is due to discharges of wastewater from various urban centers (predominantly from domestic sources) and over exploitation of fresh water from the river, which is essential to maintain self-purification capacity of the river.

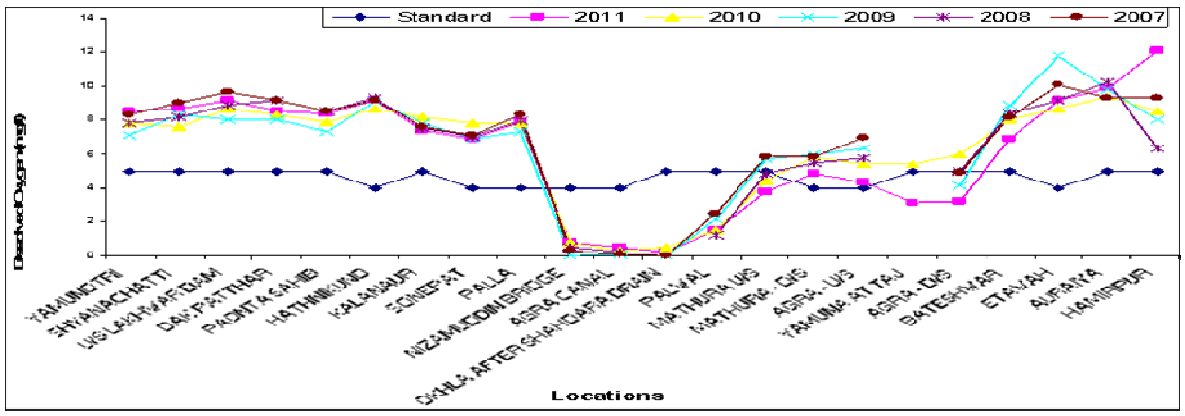


Figure 5.5: Water quality trend of river Yamuna in terms of Dissolved Oxygen

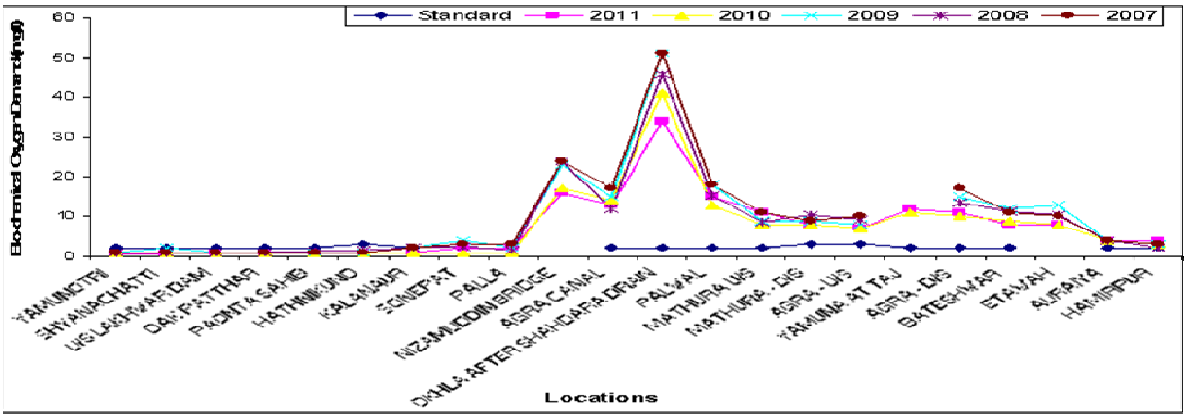


Figure 5.6: Water quality trend of river Yamuna in terms of Biochemical Oxygen Demand (BOD)

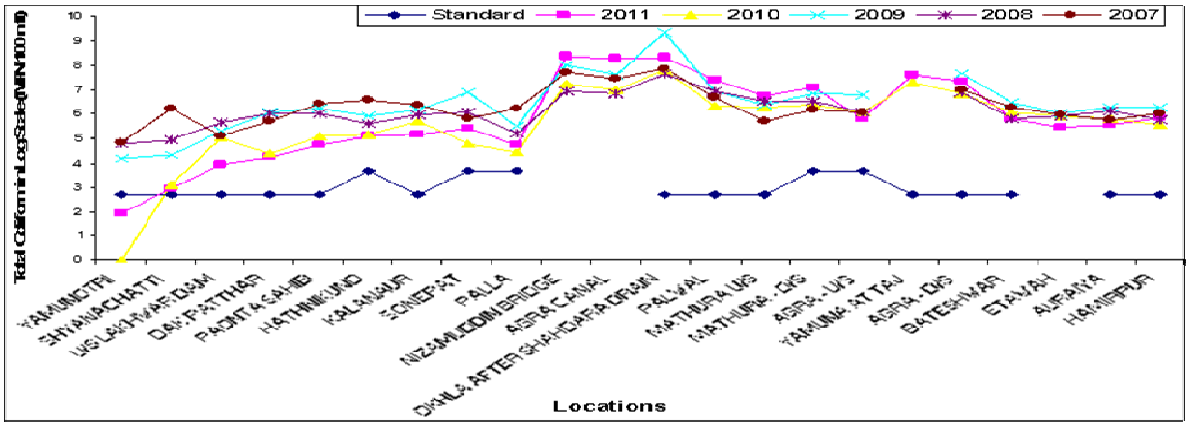


Figure 5.7 Water quality trend of river Yamuna in terms of Total Coliform (TC)

5.3 SPECIFIC OBJECTIVE ORIENTED MONITORING

5.3.1 Bio-monitoring of River Yamuna from Origin to Confluence to River Ganga

Biological monitoring provides an effective, easy to understand, less time consuming and cost effective method to determine cumulative impact of pollution. Use of benthic macro-invertebrates for bio-monitoring is based on community effects and the most frequent response of a community, which is expressed in terms of either increase or decrease in abundance of species and the population of some species remains stable. Biological water quality assessment of entire stretch of River Yamuna and tributaries, on 40 numbers of locations, was carried out by using Biological Water Quality Criteria (BWQC) (Table 5.3). Bio-monitoring was undertaken at 10 locations on River Yamuna from Janakichetti to Dak Patthar in Uttarakhand. Biological water quality of River Yamuna at Barkot, was heavily polluted (Class 'D' of Biological Water Quality Criteria (BWQC)) in upper stretch of Uttarakhand. After entering state of Himachal Pradesh, the water quality improved to slight pollution (Class 'B', Biological Water Quality Criteria) at Paonta Sahib and at Panipat in Haryana. Heavy pollution in water quality was observed again at Sonepat in Haryana.

In Delhi, water quality of River Yamuna was devoid of aquatic life and thus exposed to severe pollution (Class 'E', Biological Water Quality Criteria) at ISBT. Thereafter water quality improved to moderate pollution (Class 'C', Biological Water Quality Criteria) in river stretch upto Mathura. At Gokul Barrage in Mathura water quality further deteriorated to Heavy pollution (Class 'D', Biological Water Quality Criteria). Entire stretch from Mathura downstream to Allahabad remained moderately polluted except at Banda where there was slight pollution (Class 'B', Biological Water Quality Criteria) in water quality due to confluence of various tributaries such as River Chambal, Betwa and Ken.

Table 5.3 : Biological Water Quality Criteria (BWQC)

S.No	Taxonomic Groups	Range of Saprobic score (BMWP)	Range of Diversity Score	Water quality characteristic	Water quality class	Indicator Color
1	Ephemeroptera, Plecoptera, Trichoptera, Hemiptera, Diptera	7 and more	0.2 - 1	Clean	A	Blue
2	Ephemeroptera, Plecoptera, Trichoptera, Hemiptera, Planaria,	6 – 7	0.5 - 1	Slight Pollution	B	Light blue

S.No	Taxonomic Groups	Range of Saprobic score (BMWP)	Range of Diversity Score	Water quality characteristic	Water quality class	Indicator Color
	Odonata, Diptera					
3	Ephemeroptera, Plecoptera, Trichoptera, Hemiptera, Odonata, Crustacea, Mollusca, Polychaeta, Diptera Hirudinea, Oligochaeta	3 – 6	0.3 - 0.9	Moderate Pollution	C	Green
4	Mollusca, Hemiptera, Coleoptera, Diptera, Oligochaeta	2 – 5	0.4 & Less	Heavy Pollution	D	Orange
5	Diptera, Oligochaeta No macro invertebrates	0 – 2	0 - 0.2	Severe Pollution	E	Red

5.3.2 Monitoring of major drains in NCT Delhi

Major wastewater outfalls of NCT-Delhi are regularly monitored by Central Pollution Control Board on monthly basis. In the year 2011, total 23 major drains were monitored which joins Yamuna River (19 drains) and Agra/Gurgaon canals (4 drains). Two major drains i.e. Najafgarh and Shahdara drain also receive wastewater from neighbouring States of Haryana and Uttar Pradesh. Last ten years (2002-2011) trend of Bio-chemical Oxygen Demand (BOD) load and discharge of these drains is depicted in Figure 5.8. The collective annual average for the year 2011 in terms of discharge and Bio-chemical Oxygen Demand load of the studied drains was about 4330 MLD and 295 Tones/day (TPD) respectively. Yamuna River receives about 84 percent of the total BOD load through major drains and rest through canals. About 90 percent of the total discharge joins the river through these drains and rest to canals. In the year 2011, there was an increase of about 4 percent in discharge of the monitored drains as compared to previous year, which may be due to variation in the rate of rainfall and city water supply. The BOD load also reflects significant increase of about 20 percent in the year 2011 compared to previous year, which may be either due to flactuations in organic waste generation or variation in the efficiency of wastewater collection, transportation and treatment system. Najafgarh and Shahdara drains continue to remain highest contributors to BOD load and discharge. These two drains contribute about 66 percent of BOD load and about 72 percent of total discharge.

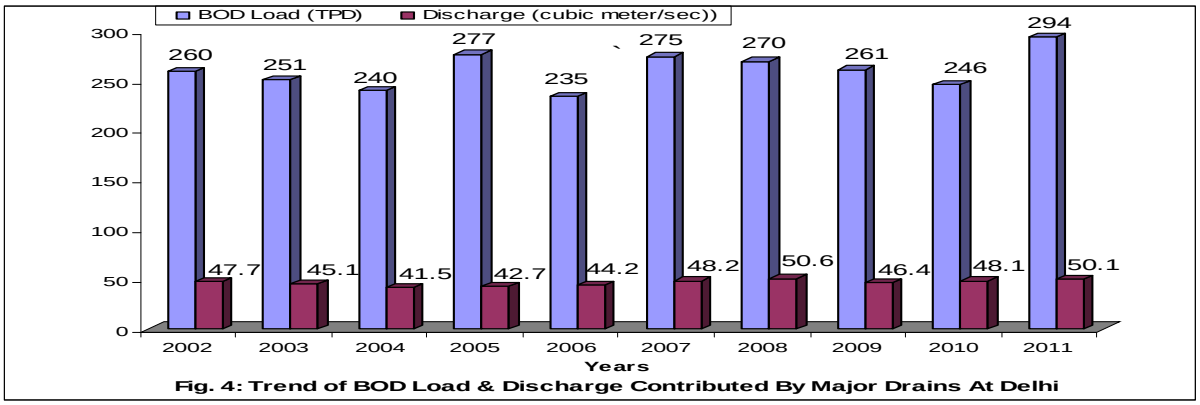


Figure 5.8: Trend of Bio-chemical Oxygen Demand (BOD) load and discharge contributed by major drains at Delhi

5.3.3 Study of drains in Taj Trapezium Zone (TTZ)

The study of drains discharging effluent in to river Yamuna was carried out at Mathura, Agra and Firozabad during the year. There are 20 major drains in Agra, 19 in Mathura, 18 in Vrindavan and 02 in Firozabad. In Agra, the waste water flow ranges from 2.59 to 65.61 MLD in various drains. A few of these drains, like Mantola Drain, Bhairon drain and Old Water Works drain convey significant volumes of storm water. In Mathura, the waste water flow was measured in the range of 1.6 to 96.33 MLD and in Firozabad it was between 27.3 to 71.79 MLD. Water quality of some of the major drains is presented in figure 5.9.

The problems associated with these drains are primarily dilapidated condition, heavy silting, absence of cleaning, accumulation of solid waste including plastic bags, unscrupulous dumping of solid waste by public and encroachment over the drains. Blocked flow of these drains generally results in overflow and water logging conditions, cleaning problems; which may result in various health hazards.

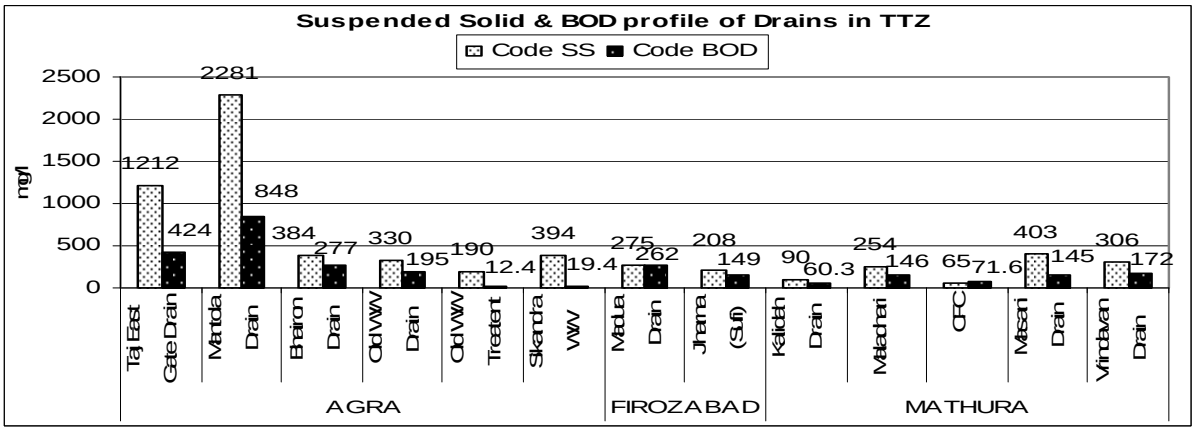


Figure 5.9: Suspended solid & BOD load profile of various drains in TTZ

5.3.4 Interstate River Water Quality Monitoring

One of the function of the Central Pollution Control Board, under Section 16 2(b) of the Water (Prevention and Control of Pollution) Act, 1974 is to "coordinate the activities of the State Boards and resolve disputes among them".

There are increasing number of incidences where interstate rivers are getting polluted and the states in downstream are complaining about the quality of water receives from the upstream state. Realizing the gravity of the problem, CPCB had discussed this issue with the State representatives in the 51st Conference of Chairmen & Member Secretaries held in February 14-15, 2005. It was decided that CPCB should regularly monitor the water quality of the rivers at interstate borders. As a follow-up of the decision, CPCB through its zonal offices and Head office initiated monitoring of all the important rivers at interstate borders. The results obtained so far indicated that river water of 15 rivers at 26 locations were found deteriorated with respect to Biochemical Oxygen Demand (BOD) out of 86 monitored.

In view of above, CPCB carried out water quality monitoring at interstate boundaries of a few rivers. Details are provided below:

- In Eastern zone monitoring was done at 8 locations of 5 rivers viz. Churni (Bangladesh & West Bengal), Damodar (West Bengal & Bihar), Subarnarekha (West Bengal, Jharkhand and Orissa), Indravati (Chattisgarh & Orissa) and Mahanadi ((Orissa and Chattisgarh). Two rounds of sampling for eight locations during summer and winter each and 5 locations during the Post Monsoon were undertaken during year 2011 – 2012. The measured parameters such as Temperature, pH, Conductivity, DO, BOD, NO_3-N, TKN, Total & Faecal Coliform, PO_4-P, SO_4^{-2} , TSS , TDS, TFS, Alkalinity, Total Hardness, Calcium, Magnesium, Chloride, COD, Sodium, Potassium and heavy metals were taken into account to verify the input of pollutants to river from the State located in upstream of the river. In case of river Damodar, all the measured parameters except ammonia and iron were found decreased. The possible reason is that water flowing through Sindhri (Bihar) ultimately reaches Disergarh (West Bengal) via Panchet Dam. As a result, the river has lost its riverine ecosystem leading to alteration of hydro-chemistry. Another tributary i.e. river Barakar discharging its water before Disergarh causes dilution of soluble salts. The increase of NH_3-N may be attributed to ammonification of organic nitrogen in impounded water and also to transportation of leachable NH_3-N through surface run-off because that increment was observed mainly during monsoon. Organic substances in terms of BOD and COD were found more or less similar in both the stations. Therefore, actual movement of pollutants between the two States cannot be explained without

detailed investigation of chemical and biological processes going on in dam and quality and quantity of water of river Damodar and its tributary. The assessment of water quality of River Subarnarekha at Beheragora (Jharkhand), Lakhannath (Orissa) and Gopiballavpur (West Bengal) exhibited little changes in soluble salts in the river stream of interstate boundaries mainly during summer. In case of Subarnarekha, values of Conductivity, TDS and SO_4 at Beheragora were found higher as compared to other two locations (Lakhannath and Gopiballavpur). The PO_4-P concentration was relatively high in Lakhannath and Gopiballavpur (0.098 and 0.077 mg/l) as compared to Beheragora (0.039 mg/l) whereas no change in concentrations of NH_3-N and TKN was detected. The change of PO_4-P concentration particularly during summer needs to be investigated. The water quality of Mahanadi at Hirakud (Orissa) and Indravati at Navrangpur (Chattisgarh) did not exhibit any impairment, though input from upper stretch of the river located in another state could not be verified due to paucity of data. The water quality of river Churni meeting river Hugli clearly indicated almost anoxic condition (DO: 0.46 mg/l) during summer though during wet season DO attained 2.4 mg/l. The possible reason is that this river water is enriched with oxygen demanding substances (BOD: 16 mg/l and COD: 78 mg/l) leading to depletion of DO through biological oxidation. The ratio of BOD to COD and prevailing TKN concentration (3.4 mg/l) in Churni clearly indicated substantial amount of non-biodegradable substances particularly during summer. In terms of bacterial contamination, all the stations under the study was largely infested with high counts of Total Coliform and Fecal Coliform.

Data generated in joint sampling programme by CPCB and State Boards in the eastern zone were collated and compared to examine differences in analytical results.

No systematic pattern of differences was noted because differences were random with respect to the measured parameters. CPCB is going to prepare action plan to investigate actual spatio-temporal trend by powerful statistical methods that may lead to new interpretation regarding the human impact on aquatic environment and effectiveness of pollution control measures advocated by Central Pollution Control Board.

- In Western Zone (Maharashtra and Gujarat), there are 14 Water Quality Monitoring stations identified on various rivers at the Inter-state boundaries of Gujarat, Maharashtra, Rajasthan, Madhya Pradesh and UT of Daman. After rationalization of the locations, monitoring undertaken at 12 locations during the year. Except Damanganga river between Gujarat and UT of Daman no adverse effect observed at other inter Sate Rivers in the study zone.

Concerned SPCBs/PCCs were requested to take remedial measures to restore water quality of these identified polluted rivers at interstate borders. CPCB also pursued the remedial measures through discussions, deliberations, zone wise meetings with SPCBs/PCCs including legal actions.

- The North Eastern Region is mostly hilly terrain, though small in geographical area, inhabited by different tribes with different cultures and traditions. The region is divided in to eight small States and most of the rivers in these States are flowing across State boundaries, and even international boundaries. During year 2011-12 the water quality in the main rivers crossing State and international boundaries were monitored. The water quality of Dhansiri River (Flowing from Nagaland to Assam) and Barak River (starting from Manipur then flows between Manipur and Mizoram, Manipur and Assam then flowing through Assam lastly enters to Bangladesh) were mainly monitored. Water Quality in these rivers was assessed by Physico-Chemical analysis and bio-monitoring of the river water. The Biological water quality ranges from A class (in the upstream) to C class (in the downstream). Most of the Physico Chemical Parameters have been found within permissible limit.

River Damanganga Water Quality In Vapi-Daman Region

In view of the impact on the river due to discharges of industrial effluent from Vapi (through CETP) as well as discharges from Distilleries of Daman the water quality of River Daman Ganga has attracted a great concern. The Central Pollution Control Board has taken various steps, and undertaken monitoring of Damanganga River & CETP at Vapi at following locations.

- Damanganga River, GIDC Weir, U/S of CETP discharge, Vapi
- Namdha village, Gujarat
- Damanganga River near Jari Causeway (Gujarat-Daman Border), and
- Jetty, Nani Daman

The water quality status at these locations, are presented in Table-5.4:

Table 5.4 : Water Quality of River Damanganga at interstate boundaries

Date of sampling	Sampling location	Parameters							
		pH	TSS	TDS	DO	COD	BOD	NH_3-N	Phenol
24.04.2011	01	7.28	5	146	7.73	13	3.8	0.85	BDL
	02	7.49	113	8990	1.48	145	15.1	14	0.157
	03	7.34	148	14389	3.82	122	8.4	10.5	0.045
	04	7.94	344	32913	5.91	149	3.4	0.88	BDL
06.07.2011	01	7.91	33	121	7.9	15	3.3	1.4	BDL

Date of sampling	Sampling location	Parameters							
		pH	TSS	TDS	DO	COD	BOD	NH_3-N	Phenol
	02	7.49	259	24983	0.62	157	21	22	0.13
	03	7.53	195	27387	0.94	154	13	20	0.02
	04	7.67	251	33354	3.5	97	6	5.3	0.001
21.07.2011	01	8.90	-	131	7.37	9	0.85	0.14	BDL
	02	8.65	-	138	7.27	33	4.2	0.29	BDL
	03	8.45	-	192	7.18	36	3.3	0.43	BDL
	04	8.33	-	206	7.16	21	2.9	0.58	BDL
16.11.2011	01	8.26	8	180	9	11	4.2	0.15	BDL
	03	7.54	30	3469	3.8	86	4.4	2.44	0.007
	04	7.56	46	7322	2.2	107	4	1.34	0.04
10.02.2012	01	8.39	10	187	8.4	8	2.3	0.87	BDL
	03	8.08	67	18105	3.8	270	24	4.3	0.06
	04	7.84	209	33871	6.4	234	37	0.72	BDL

Note: All the parameters except pH are expressed in mg/l

- Monitoring of River Sutlaj, Beas, Sone, Betwa, Ramganga, and Ganga was carried out on quarterly basis at the Inter-State boundary of Himachal Pradesh, Punjab, U.P., M.P. and Bihar (Table 5.5).

Table 5.5 : Interstate water quality monitoring locations in North and Central Zone

S. No.	River	Sampling Location	Frequency	Remark
1.	**Ganga**	Tarighat, Ghazipur (U.P.)	Quarterly	***Quality Class 'C'**
2.	**Betwa**	Kanjia Bridge, (12 km from Mongoli Vill towards M.P)	-do-	**-do-**
3.	**Betwa**	D/S Dukana Dam near Talbehat U.P.	-do-	**-do-**
4.	**Sone**	Chopan Village (U.P.)	-do-	**-do-**
5.	**Sone**	Rehand Dam,Deora (M.P.)	-do-	**-do-**
6.	**Sutlej**	Nangal (Punjab)	-do-	**-do-**
7.	**Sutlej**	Olinda (H.P)	-do-	**-do-**
8.	**Drain**	Golthai drain (HP)	-do-	**-do-**
9.	**Drain**	Sohana Drain (PB)	-do-	**-do-**
10.	**Beas**	Babe ki Kutia, Talwada (PB)	-do-	**-do-**
11.	**Beas**	H.P. (Shah Barrage towards Pong dam)	-do-	**-do-**

Fecal Coliform MPN/ 100 ml –
< 50, Class 'A' water. (Suitable for drinking)
< 500, Class 'B' (Suitable for Bathing)
***< 5000, Class 'C' (suitable for Agriculture)*

5.3.5 Biomonitoring of River Brahmani & its tributary in Angul Talcher area

Brahmani is the major river flowing through Angul- Talcher area. Few small streams flow through this area and feed river Brahmani during monsoon. Nandira Jhor is one of them, which carries bulk of water supply and effluent load from this area. Industries located near Nandira Jhor are mostly red categories industries such as NALCO, NTPC, Bhusan Steel Limited (PP), Nav Bharat Ventures Ltd.(CPP) and BRG Iron and Steel Co Ltd.,

CPCB Zonal Office Kolkata has undertaken a bio monitoring programme to provide pertinent information on water quality of river Brahmani and its tributary Nandira Jhor. In this study the number of species and composition of aquatic communities were investigated in the backdrop of physico-chemical parameters to evaluate the status of biodiversity. The major taxonomic groups found in river Brahmani are Odonata, Mollusca, Crustacea, Hemiptera, Coleoptera, Ephemeroptera and Diptera. Apart from above taxonomic groups Plecoptera was also found in Nandira Jhor. In this study, range of diversity score of all the stations was between 0.3 to 0.7 and saprobic score was between 5.1 and 6.2 indicating moderate pollution in river Brahmani and Nandira Jhor (i.e. C-Class) in accordance with Biological Water Quality Criteria (BWQC) defined by CPCB. Diversity score of Brahmani at upstream of Nandira was found between 0.3 to 0.4. Decrease of diversity score at these points may be attributed to dredging activities and poor substratum which reflects ecological perturbation. However, in River Brahmani, at the downstream of Nandira jhor, diversity score increases from 0.39 to 0.62 suggesting improvement of water quality. Further decrease of diversity score to 0.35 was at extreme downstream of Nandira Jhor may be attributed to dredging activities. It is interesting to note that physico-chemical parameters considered in this study did not indicate any adverse impact on river water.

5.3.6 Monitoring under National River Conservation Directorate (NRCD) Project

The project funded by NRCD, Ministry of Environment & forests Govt. of India for surveillance of stretch from Allahabad to Tarighat (Ghazipur) is being executed by Central Pollution Control Board Zonal Office (North), Lucknow The monitoring is being carried out under the project for performance evaluation of Sewage Treatment Plants once a month and monitoring of river water quality twice in a month.

CPCB has identified 150 river stretches. These river stretches have been taken into consideration by NRCD under interception, diversion and treatment schemes

under various River Action Plans and study of polluted segment of rivers to address municipal as well as industrial components besides management aspects. And its initiated study for 9 stretches on 9 rivers (River Musi & Nakkavagu in Andhra Pradesh; River Chambal & Khan in Madhya Pradesh and River Bhima and Tributaries -Mula, Mutha, Mula Mutha, Pawana, Indrayani; River Godavari, Koyna, Mithi & Kundalika in Maharashtra) through State Pollution Control Boards (SPCBs) of Andhra Pradesh, Madhya Pradesh and Maharashtra.

Table 5.6 Sewage Treatment Plants (STPs) in Allahabad to Tarighat (Ghazipur) stretch - An Overview

STP	Place	Latitude/ Longitude	Type	Capacity (MLD)	Operating Agency	Date of Commission-ing	Remark
Mirzapur	Mirzapur	N 25°08'42.6"/ E 082°35'17.8"	UASB	14	U.P.Jal Nigam	31.01.95	**Operational**
Allahabad	Allahabad	N 25°25'03.5"/ E 081°51'17.4"	ASP	60	U.P.Jal Nigam	June-July 1999	**Operational**
Bhagwan pur (BHU)	Varanasi	N 25°16'15.3"/ E 083°00'16.7"	ASP	08	U.P.Jal Nigam	31.01.90	**Operational**
Dinapur	Varanasi	N 25°20'43.2"/ E 083°02'47.2"	ASP	80	U.P.Jal Nigam	31.01.95	**Operational**
DLW	Varanasi	N 25°17'24.8"/ E 082°57'55.5"	ASP	12	DLW	31.01.89	**Intermittentl y operated since May 2010**

5.3.6.1 Performance evaluation of Sewage Treatment Plants (STP)

Four hourly composite samples for of twenty four hours were collected on monthly basis from inlet, outlet and other relevant sectors of all the five STPs at Allahabad, Mirzapur and Varanasi were monitored to evaluate the performance of STP.

- Sewage received at Mirzapur STP is of the order of 18-20 MLD far in excess of the capacity of STP (14 MLD). This results in regular by-pass of untreated sewage to river Gagna through Ghore Shaheed drain.

- STP at Mirzapur has no provision for gas holding resulting in wastage of resource which can otherwise be utilized in power generation and other environment friendly activities.

- STP at DLW, Varanasi is regularly noted with intermittent flow which affects overall performance and capacity utilization.

- STP at Bhagwanpur, Varanasi is noted with gas holder non-operational since last two years. There has been no record of gas generation. Hence correlation of gas generation and plant performance (COD reduction) could not be undertaken.

- STP at Dinapur, Varanasi has been generally observed to receive sewage flow of the order of 90 MLD. This results in by-pass of untreated sewage to river Ganga.

Table 5.7 Performance of STP capacity (60 MLD) at Allahabad

Month	Flow (MLD)	Performance (in terms of % Reduction)		
		BOD	SS	COD
April	51.61	80	92	85
May	46.62	58	87	68
June	62.9	77	88	86
July	62.9	68	79	75
August	71.04	75	80	88
September	27.57	70	86	80
October	42.36	-	-	-
November	44.4	86	87	86
December	49.03	68	88	74
January	46.44	94	98	96
February	46.44	78	88	84
March	43.85	72	96	78

Table 5.8 Performance of STP capacity (14 MLD) at Mirzapur

Month	Flow (MLD)	Performance (in terms of % Reduction)		
		BOD	SS	COD
April	12.91	77	70	70
May	13.37	72	86	92
June	-	-	-	-
July	9.39	48	36	47
August	13.38	81	94	72
September	9.93	92	79	93
October	10.91	84	88	74
November	16.74	81	92	88
December	13.49	76	86	80
January	15.81	77	90	77
February	14.5	83	88	80
March	14.5	78	73	70

Table 5.9 Performance of STP Capacity (80 MLD) at Dinapur, Varanasi

Month	Flow (MLD)	Performance (in terms of % Reduction)		
		BOD	SS	COD
April	84.69	81	72	87
May	61.25	95	98	96
June	-	-	-	-
July	99.52	94	90	96
August	97.15	94	90	96
September	88.15	86	81	86
October	95.44	93	81	86
November	86.25	78	84	77
December	75.22	87	86	86
January	75.22	71	85	65
February	78.04	80	80	78
March	67.12	64	75	63

5.3.6.2 Monitoring of Water Quality of River Ganga

Water quality has been monitored at following 15 locations on different tributaries of the river during the year:

1. River Ganga u/s Allahabad
2. River Yamuna b/c with River Ganga
3. Bathing Ghat at Sangam
4. River Ganga d/s Allahabad ¼ width
5. River Ganga d/s Allahabad ½ width
6. River Tons b/c with River Ganga
7. River Ganga at Pakka Ghat Vindhyachal
8. River Ganga u/s Varanasi
9. River Ganga at Dashashwamegh Ghat
10. River Ganga near Malviya Bridge at Varanasi
11. River Varuna b/c with River Ganga
12. River Ganga d/s Varanasi ¼ width
13. River Ganga d/s Varanasi ½ width
14. River Gomti b/c with River Ganga
15. River Ganga at Tarighat

The status of water quality as observed in different phases of monitoring indicated:

That D.O. observed in the complete stretch was more than 5 mg/l i.e. well within the limit to conform the water quality as Class 'B' whereas in River Varuna DO was found below 5 mg/l. The River works as a drain to carry the excess effluent of Dinapur STP and few minor drains of Varanasi. In terms of BOD, the complete

stretch does not conforms the water quality under Class-B especially in summer season as the BOD limit in this class permits up to only 3 mg/l. At all other locations water quality has been mainly affected by high levels of coliform. As a significant observation, the poor water quality observed at Sangam in Allahabad and Dashashwamegh Ghat (Varanasi), where high BOD (5.6 mg/l) has rendered the water unfit for bathing in winter season. Water quality of River Varuna found deteriorating due to uncontrolled discharge of city waste and by pass of Konia pumping station feeder to Dinapur STP.

With reference to designated best use classification, the entire stretch of River Ganga from Hardwar to Tarighat has been designated as conforming to class 'B', which implies that water quality should be fit for uses like bathing, swimming, water contact sport. In case of River Yamuna, for which water quality is monitored at Allahabad, the water quality must conform to Category B.

5.3.6.3 Status of River Water Quality in Allahabad during Magh Mela, 2012

Every year during the Hindi month of *Magh* (January/February) thousands of people take bath at Sangam (Confluence of River Ganga and Yamuna) Allahabad. Considering mass bathing activities at the occasion, CPCB Zonal office (North), Lucknow conducted a study to assess the quality of River Ganga and Yamuna at various locations in Allahabad including Sangam during the Magh Mela period, 2012. Water quality profile at Sangam is presented in figures 5.10 and 5.11 and salient observations are as below:

Bath at Sangam during Magh Mela

- The Dissolve Oxygen (DO) varied from 8.2 to 9.0 mg/l, Biochemical Oxygen Demand (BOD) varied from 2.3 to 7.5 mg/l, Chloride content 17.9 to 55.7 mg/l, & Fecal Coliform 4600 to 5400 MPN/ 100 ml. It was noticed that the concentration of different pollutants was minimum during morning hours and maximum in the evening hours.
- Water quality of River Ganga at Sangam in Allahabad during Makarsankranti festival has been found improving since 2009 with respect to color, DO and BOD. It indicates that the organic load on river Ganga has been reduced, may be due to the preventive measure under taken at different levels as well as society. Similar observation was recorded at other locations during Maghmela at Allahabad.

- Another factor which affects the water quality of river is availability of sufficient water for bathing at Sangam during Magh Mela. In this regard, Hon'ble High Court of Allahabad has issued the order for release of more than 2500 cusec water from Narora barrage to River Ganga from time to time during Maghmela which helped in improving the water quality to a great extent. The discharge of water in the River Ganga was more during year 2012 in comparison to year 2011. In addition, preventive action was taken by the SPCB to reduce the industrial discharge in the River Ganga prior to Magh mela. During Magh mela the water discharge in the River Ganga was 470- 619 Cusec and maximum water discharge was on January 14, 2012 i.e. 619 cusec. (Data collected from Central Water Commission, Varanasi).

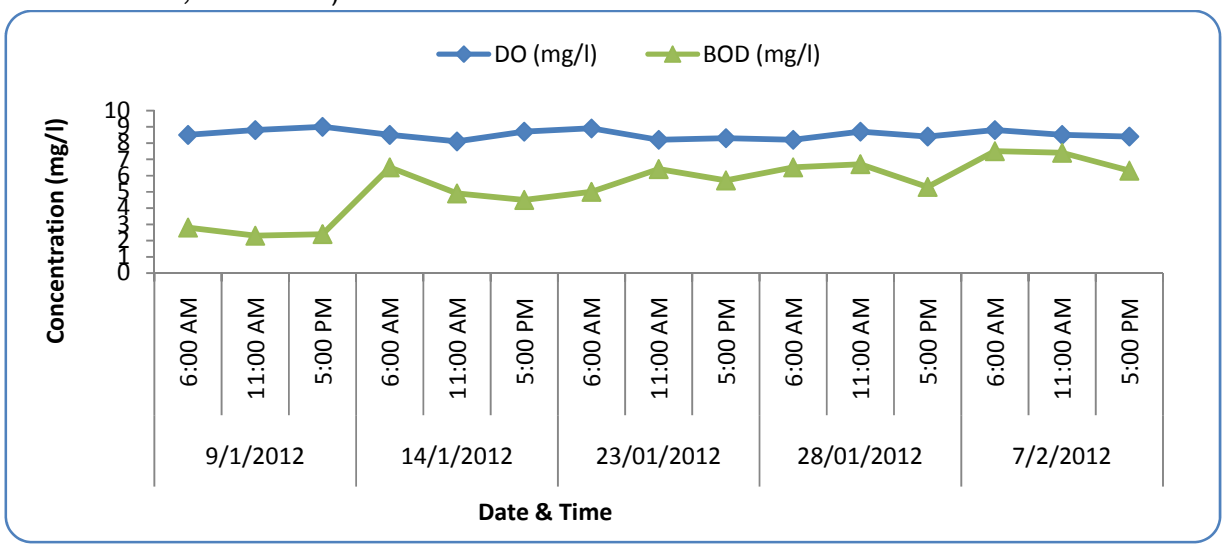


Figure 5.10 Water Quality profile (DO & BOD) at Sangam, Allahabad

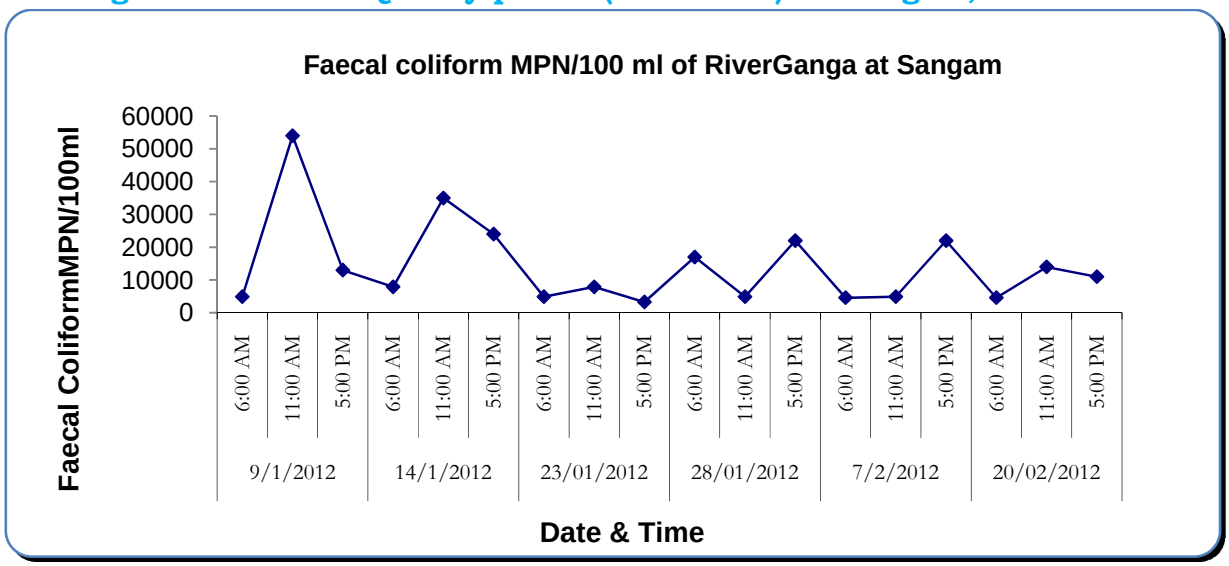


Figure 5.11 Water Quality profile (Faecal Coliform) at Sangam, Allahabad

5.3.7 Activities under National Ganga River Basin Authority (NGRBA) Projects

Central Pollution Control Board, Zonal office, Lucknow has been executing project "Inventorisation of Pollution Sources in Ganga Basin". Following activities are being undertaken in the Project:

- Compliance verification of grossly polluting industries.
- Adequacy assessment of Common Effluent Treatment Plant.
- Performance evaluation of Sewage treatment plant.
- Intensive water quality monitoring in polluted stretches.
- Periodic pollution Assessment of major drains falling into River Ganga.
- Comprehensive groundwater monitoring in adjacent districts of River Ganga.

A summary of activities performed under the project during the year are as under :

a. **Groundwater:** More than seventy locations have been monitored in Bareilley, Aligarh, Unnao, Kanpur, Allahabad and Varanasi for groundwater quality monitoring.

b. **Drains:** Drains carrying the urban wastewater from the different parts of the city and meeting River Ganga have been monitored to assess the pollution load of different pollutants in the River through Bareilley to Kannauj on River Ramganga, Aligarh to Kannauj on River Kali, Kanpur to Varanasi in River Ganga.

c. **Industries:** More than seventy five units were visited for verification of compliance of different norms prescribed under the Air/Water act / Authorization for the Hazardous Waste (MH &TM) Rules 2008.

d. **Polluted Stretch:** Polluted stretches of River Ramganga, River Kali & River Ganga have been monitored to assess the water quality at different locations.

5.3.8 Performance Evaluation of Sewage Treatment Plants of Delhi and National Capital Region (NCR)

Sewage Treatment Plants in Delhi have the total installed capacity of 2305 MLD whereas utilization capacity is 1252 MLD i.e 53%. Performance Evaluation Analytical results of various Sewage treatment Plants (STPs) are depicted in Table 5.10.

Table 5.10: Status and Performance of Sewage Treatment Plants at Delhi

S. No.	Sewage Treatment Plant	Installed Capacity (MGD)	Present Utilization (MGD)	BOD (mg/l)		COD (mg/l)		TSS (mg/l)	
				Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
1.	Coronation Pillar Phase-I	10	19.95	87	9	301	58	437	26
	Coronation Pillar Phase-II	10+10		418	9	1592	58	722	28
	Coronation Pillar Phase-III *	10 Total-46 including Oxidation Ponds		-	-	-	-	-	-
2.	Oxidation Ponds-Timarpur *	6	-	-	-	-	-	-	-
3.	Keshopur Phase-I *	12		-	-	-	-	-	-
	Keshopur Phase-II *	20		-	-	-	-	-	-
	Keshopur Phase-III *	40 Total-72		-	-	-	-	-	-
4.	Okhla Phase-I	30	122.74	147	47	464	172	491	73
	Okhla Phase-II	12		196	70	611	323	554	2
	Okhla Phase-III	37		196	36	611	114	554	69
	Okhla Phase-IV	45		112	33	381	119	272	58
	Okhla Phase-V	16 Total-140		115	24	521	115	332	63
5.	Narela	10	2.6	51	12	154	51	204	23
6.	Najafgarh	5	0.2	115	7	401	51	304	25
7.	Nilothi	40	9.45	178	19	583	89	316	43
8.	Dr. Sen Nursing Home Nalla	2.2	2.53	306	3	925	13	969	6
9.	Delhi Gate Nalla	2.2	2.43	106	4	446	14	248	24
10.	Yamuna Vihar Phase-I	10	11.77	134	8	319	57	221	47
	Yamuna Vihar Phase-II	10 Total-20		92	8	407	71	301	60
11.	Pappan Kalan	20	8.14	179	5	625	32	513	22
12.	Kondli Phase-I	10	45	219	28	466	71	286	91
	Kondli Phase-II	25		97	16	381	68	388	13
	Kondli Phase-III	10 Total-45		86	18	400	62	218	21
13.	Mehrauli	5	1.7	217	21	755	113	585	33
14.	Rohini	15	-	-	-	-	-	-	-
15.	Rithala (Old)	40	47.32	110	11	426	42	250	29
	Rithala (New)	40 Total-80	-	110	21		79		28
16.	Vasant Kunj Phase-I	2	4.6	156	42	542	166	494	100
	Vasant Kunj Phase-II	3 Total-5		169	18	565	47	337	51
17.	Ghitorni	5	-	-	-	-	-	-	-
Total		**512.4 (2305MLD)**	**278.43 (1252 MLD)**	***Note: * STPs are under augmentation***					

It is evident from the data that with respect to BOD, STPs at Vasant Kunj Phase-I and Okhla Phase I to IV do not meet the General Standards for Discharge of Environmental Pollutants into inland surface, public sewers, land for irrigation, marine coastal areas under Schedule-VI of The Environment (Protection) Rules, 1986, while STPs at Okhla Phase–II do not meet the General Standards for COD.

Central Pollution Control Board also monitored STPs at Sonepat, Panipat, Noida, Ghaziabad and Faridabad in National Capital region. Analytical results of these STPs are presented in Table 5.11.

Table 5.11: Status and Performance of Sewage Treatment Plant in NCR

S. No.	Sewage Treatment Plant	Installed Capacity (MLD)	Present Utilization (MLD)	BOD (mg/L)		COD (mg/l)		TSS (mg/l)	
				Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
Haryana									
1.	Sonepat	30	45	134	50	342	258	352	130
2.	Panipat Jattal Road	10	17	112	152	359	490	165	58
3.	Panipat-UASB–Siwah	35	50	107	44	533	234	58	182
4.	Faridabad Badshapur	65 (45+20)	45	186	(28 & 50)	549	(73&118)	435	(30 & 63)
5.	Faridabad-Mirzapur	45	24	140	70	404	180	276	84
6.	Ballabgarh STP	50	-	-	198	-	564	-	638
Uttar Pradesh									
1	Noida Sec 54	23	23	165	14	478	56	126	19
2	Noida Sec 50	33	30	126	14	345	55	82	25
3	Indirapuram	56	56	152	52	434	122	227	28
4	Vijay Nagar	73	73	180	47	516	132	165	35

Note : '-' that plants are under renovation / upgradation.

With respect to BOD, STPs at Panipat - Jattal Road, Panipat- UASB – Siwah, Faridabad- Mirzapur, Ballabgarh, Indirapuram and Vijay Nagar do not meet the General Standards for Discharge of Environmental Pollutants into inland surface, public Sewers, land for irrigation, marine coastal areas under Schedule-VI of The Environment (Protection) Rules, 1986. The STPs at Sonepat, Panipat, Jattal Road and Ballabgarh do not meet COD Standards.

5.3.9 Investigations regarding specific complaints of Water Quality

Besides regular interstate river water quality monitoring, two specific complaints regarding pollution from one state affecting the neighbouring state, were referred to CPCB these were: (i) Discharge of industrial effluent from Rajasthan Bhiwadi Industrial Area into Territory of Haryana and (ii) pollution problem in Rajasthan canal due to discharge of untreated sewage from cities of Punjab. These complaints were investigated by CPCB and outcome is summarized below:

(i) Discharge of Effluent from Rajsthan Bhiwadi Industria Area into territory of Haryana

The Common Effluent Treatment Plant (CETP) of Bhiwadi Industrial Area is located near NH 71 B connecting higway for Bhiwadi and Dharuhera region. One unnamed drain is passing in front of CETP carrying industrial and domestic wastewater of Bhiwadi industrial area. The under construction Sewage Treatment Plant (STP) is also located opposite to the CETP. Satellite image of the area is depicted in Figure 5.12.

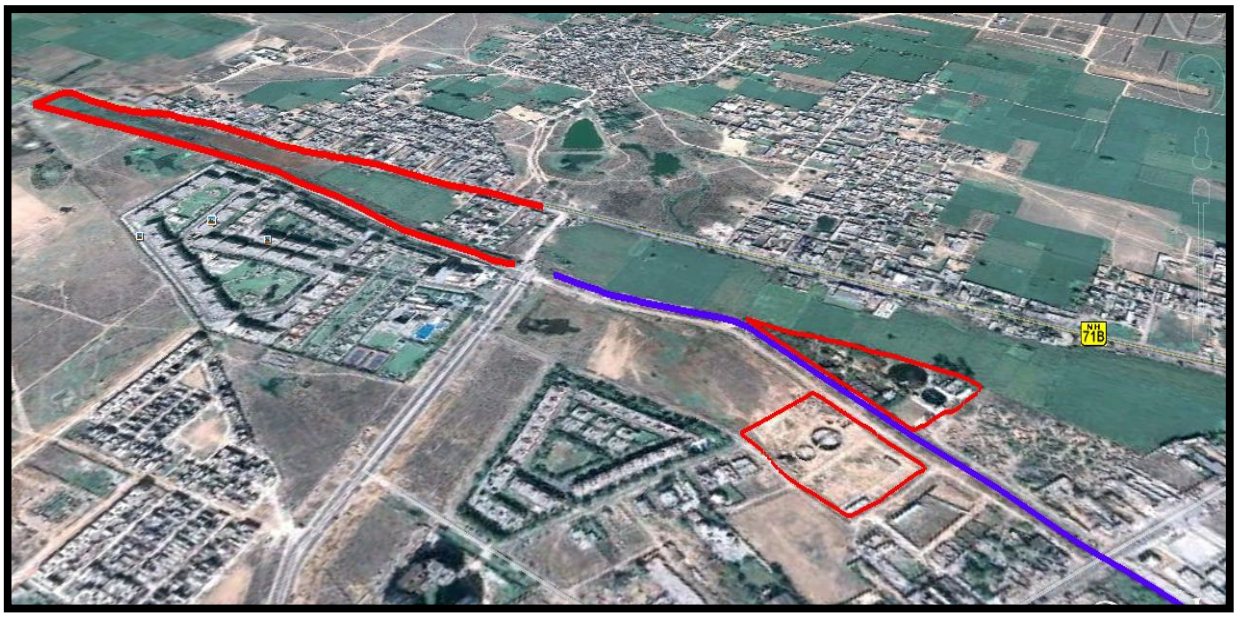


Figure 5.12: Satellite image of Study Area

During the survey, it was found that wastewater from Bhiwadi industrial area flow towards Dharuhera in Haryana near NH 71 B highway.


Waste water from Bhiwadi industrial area flowing towards Dharuhera

It was also found that the RIICO has laid down a pipe line from CETP location to Khushkhera village. Partially treated/untreated wastewater was found discharged into the barren land of Khushkhera village via conduit line. Approximately 5 km of additional pipe line will be laid and entire wastewater proposed to be discharged into Sahibi River.


Waste water from discharge into barren land of Khushkhera via conduit line

Drain carrying more than 09 MLD of sewage and industrial wastewater flow towards CETP (capacity 66 MLD) installed in Bhiwadi-Dharuhera Border. CETP running with over capacity and has provision only for physico-chemical treatment as it was designed for treatment of industrial effluent. Hence, there is no provision for the biological treatment essential for treatment of sewage. Waste water in excess to the capacity and remaining wastewater enter into Dharuhera region (Haryana) due to natural gradient. Through earthen bunds across the drain have been raised to stop the discharge but sometimes overflow of waste water finds its way into Haryana. Treated wastewater is either pumped to Khuskhera village (Rajasthan) via conduit line or discharged into same drain, which enter into Dharuhera region (Haryana) due to natural gradient.

(ii) Pollution problem of Rajasthan Canals due to release of untreated sewage from cites of Punjab

The River Beas merges with the River Sutlej at Harike Head Works. After confluence the major part of the flow is diverted through two canals namely Rajasthan feeder (Indira Gandhi Canal) and Sirhind feeder. This barrage attains a paramount importance as interstate regulation of irrigation and flood control is carried out from this barrage. Rajasthan is getting water from river Beas and Satluj system through control points at Rajasthan Feeder (Indira Gandhi Feeder), Ferozpur Feeder and Bikaner Canal (Gang Canal).

Water samples were collected from seven locations and analyzed for various physio-chemical parameters such as pH, Temperature, TDS, Sodium, Potassium, Chloride, Sulphate, Fluoride, Phosphate, Nitrite and Nitrate, Ammonical nitrogen, BOD, COD, DO and bacteriological parameters such as Total and Faecal coliform, and heavy metals such as Chromium, Iraon, Zinc, Magnesium. The sampling points are depicted on Schematic flow diagram at Figure 5.13.

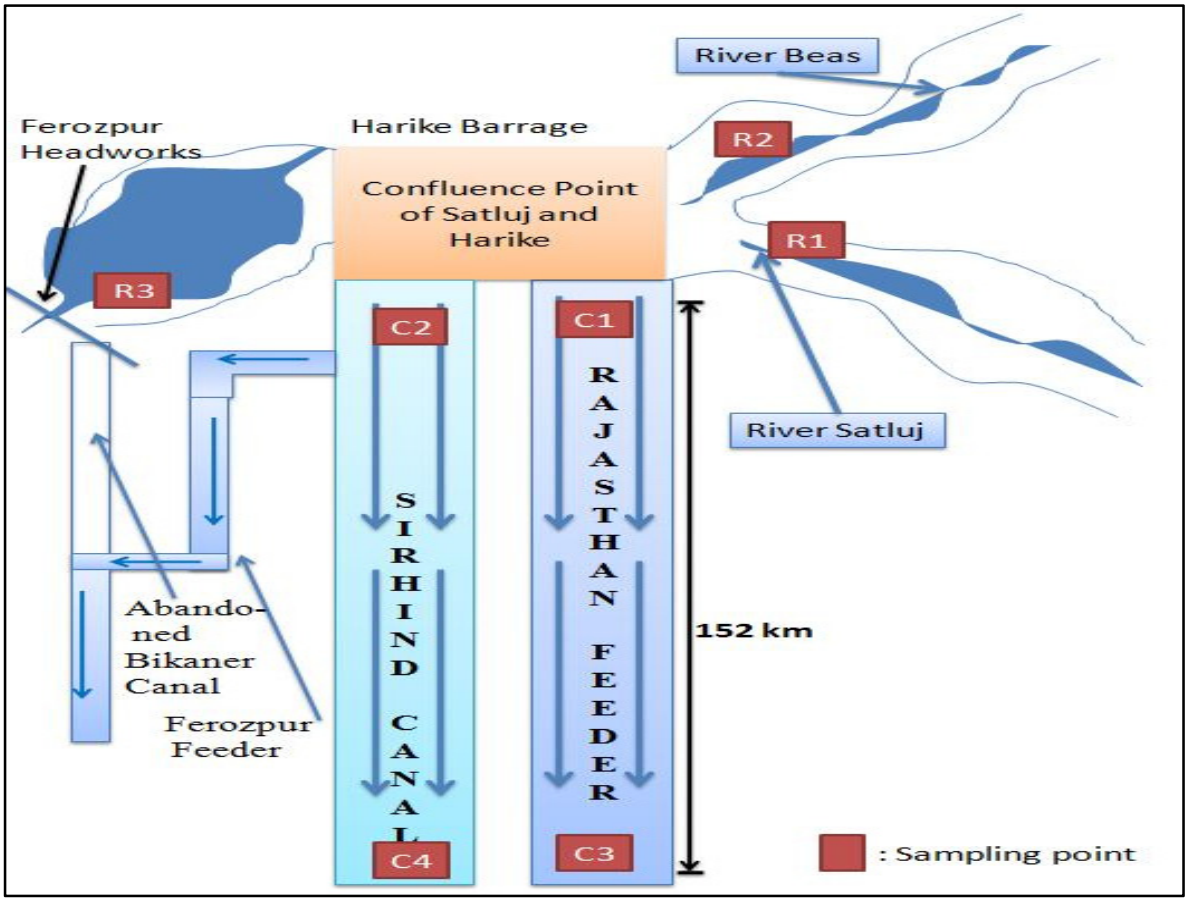


Figure 5.13: Schematic Flow Diagram depicting sampling points at Canals and River

Code	Location	Source
R1	Harike	River Beas before confluence of River Satluj
R2	Harike	River Sutlej before confluence of River Beas
R3	Ferozpur	River Satluj at Ferozpur
C1	Harike	Rajasthan Feeder
C2	Harike	Ferozpur Canal
C3	Downstream of Dabwali (Haryana-Punjab-Rajasthan Border)	Rajasthan Feeder
C4	Downstream of Dabwali (Haryana-Punjab-Rajasthan Border)	Sirhind Feeder

The findings indicate that the water quality of river Beas and Satluj conforms to designated best use category 'B' (Outdoor bathing) with respect to pH, BOD, DO. However, total coliform count was more than 90,000 MPN/100 ml and fecal coliform count more than 20,000 in both the rivers. High coliform level is attributed due to open defecation and discharge of domestic waste from towns/villages located on the bank of the river and discharge from Buddha Nallah which carries the domestic & industrial waste from Ludhiana, Macchiwara, Phillore and East Bein, which carries the domestic & industrial waste from Phagwara and Jalandhar.

Water quality of Rajasthan Feeder and Ferozpur canal was meeting the Primary Water Quality Criteria for category 'A' (Drinking Water Source without conventional treatment but after disinfection) with respect to DO, pH, BOD. Fecal Coliform and total coliform was also found in Rajasthan feeder and Ferozpur canal, which was mainly due to discharge of sewage from Ludhiana and Jalandhar. Trace amount of Nitrate-N, Nitrite-N, NH_3, Phosphate, Zinc, Maganese was found in river Beas, Satluj, Rajasthan feeder and Ferozpur canal. Water quality of Rajasthan Feeder and Ferozpur canal (152 km downstream of Harike Barrage) is meeting the Primary Water Quality Criteria for category 'A' with respect to DO, pH, BOD. Coliform level was also reduced as compared to Harike barrage. Based on the findings, specific actions have been proposed to Punjab State Pollution Control Board.

5.3.10 Reconnaissance Survey of Pollution Load of River Kali

The Kalinadi is an seasonal river, flowing during the monsoon season. It originates near Khatholi town (Uttar Pradesh) and flows through the districts of Meerut, Hapur, Bulandshar, Aligarh, Kasganj and finally merges with river Ganga at Kannauj (Uttar Pradesh). River Kali has a total length of 550 km (approximately) getting water during monsoon season and groundwater recharge, but, now,

groundwater recharge is minimal and mostly industrial & domestic wastewater is discharged into the river. The river receives considerable amounts of wastewater every day from the industries and municipal area of Meerut, Hapur and Bulandshahar which leads to deterioration of water quality.

The objective of the study was to assess the pollution level of River Kali and its tributaries drain which ultimately leads to increase in pollution level of Ganga river at downstream of Kannauj, Uttar Pradesh. Pollution load of river Kali also leads to sanitary nuisance such as generation of foul smell due to anaerobic condition.

The present study covers River Kali from Lawaru village, Uttar Pradesh (U.P) to Bulandshahar, U.P. Different types of industries (Distilleries, Paper Mills, Dairies, Sugar Mills) discharges their partially treated and untreated effluents into the river. Untreated/Partially treated sewage of Meerut, Hapur, Gulaothi leads to further deterioration of water quality of River Kali. Grab samples were collected from 10 locations (Table 5.12) and analyzed for physio-chemical parameters such as pH, TDS, TSS, Total Kjedehal Nitrogen, BOD, COD, DO.

Table 5.12: Point Sources of River Kali

Sl.No.	Code	Source	Point Source	Location	Description
1.	KD1	Drain	AbuNallah-1	Near village Gesupur	Mixed Drain
2.	KD2	Drain	AbuNallah-2	Front of Kirti Palace	Domestic Drain
3.	KD3	Drain	Slaughter House Drain or Camela Drain	Near Kajipur	Mixed Drain
4.	BG	Canal	Ganga Canal	Near Chhapokali	Fresh Water
5.	KD4	Drain	Chhuyia Drain	NH-24	Mixed Drain
6.	KD5	Drain	Hapur Drain	Near Akroli village	Mixed Drain
7.	KD6	Drain	Kadarabad Drain	Near Brijnathpur Sugar Mills	Mixed Drain
8.	KD7	Drain	Gulaothi Drain	Near Railway Track	Domestic Drain
9.	KD8	Drain	Bulandshar Drain-1	Near Devpura-1 colony	Domestic Drain
10.	KD9	Drain	Bulandshar Drain-2	Near Mohan Katti	Domestic Drain

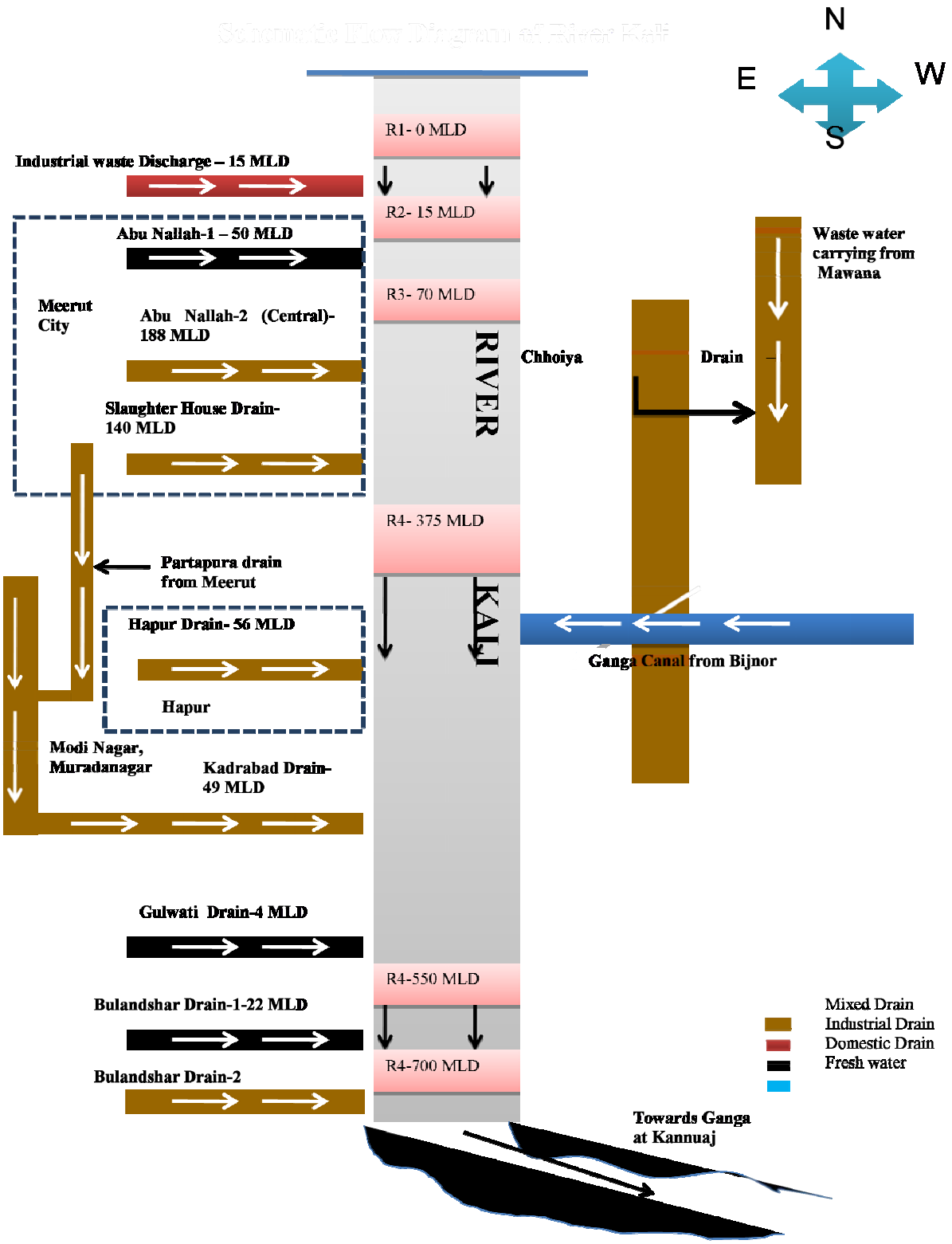


Figure 5.14: Schematic Flow diagram of River Kali

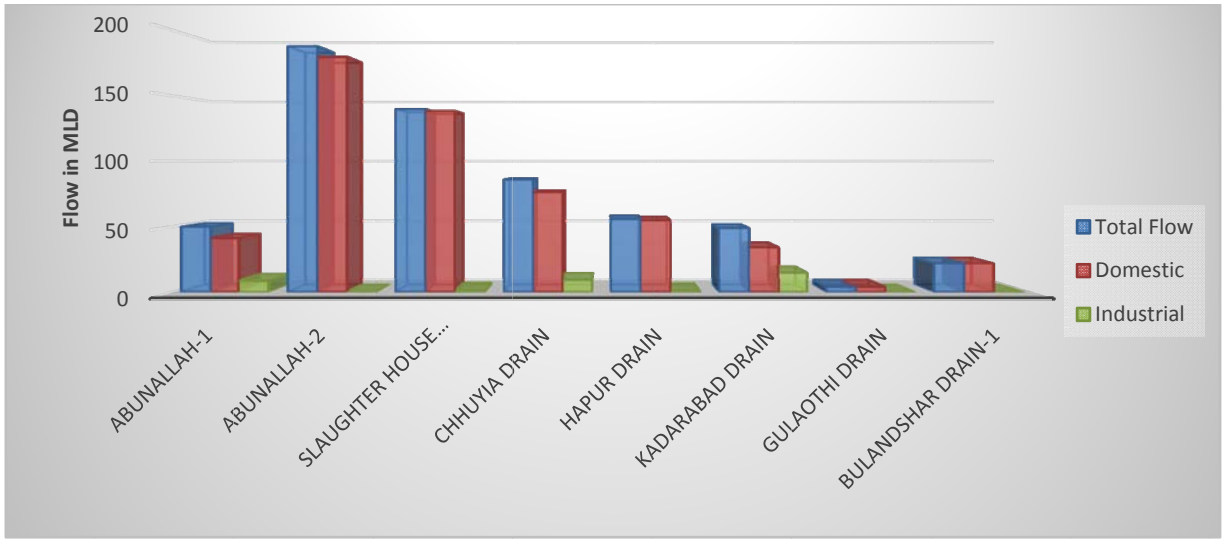


Figure 5.15: Drain-wise domestic and industrial pollution load Joining River Kali

Recommendations

Based on the study, following recommendations have been suggested:

- Odean Nallah carries maximum BOD load to river Kali therefore, slaughter houses shall treat their effluent so that effluent meet the prescribed effluent discharge standards.
- Industrial pollution load of Slaughter house drain, Chhoiya drain and Kadarabad drain needs to be curtailed by controlling industrial pollution with immediate effect.
- Uttar Pradesh Pollution Control Board (UPPCB) shall ensure that sewage from Meerut, Hapur and other cities is conveyed to Sewage treatment plants (STPs).
- UPPCB shall ensure that no industrial unit discharges its untreated/partially treated effluent into river Kali.
- Concerned Authorities of Uttar Pradesh ensure that all the wastewater shall be conveyed to STPs and CETPs so that only treated wastewater is discharged into drains or river.
- UPPCB with concerned authorities shall evolve an action plan for the abatement of pollution of river Kali.
- Mass awareness programme shall be organized to make people aware about the need of the river. Dumping of Municipal solid waste shall be stopped immediately.

5.3.11 Assessment of pollution load- river Ramganga and its adjoining tributaries

Ramganga River a tributary of River Ganges originates from Doodhatoli ranges (high altitude zone of 800m-900m) in the district of Pauri Garhwal at Uttarakhand state of India. The river flows to south west from Kumaun Himalaya. Ramganga descends upon the plains from the Corbett National Park near Ramnagar of Nainital district and flows through the plains of Kalagarh, Afzalgarh, Moradabad, Rampur, Bareilly, Shahjahanpur, finally merges with river Ganges near Kannauj (Uttar Pradesh). Several Sugar, Distillery and Pulp and Paper (mostly Agro based and Waste Paper based) industries are located in its catchments. The catchment area of the basin is about 32,493 sq. km. Total length of river from the source to the confluence with the Ganga is 596 km. The important tributaries joining Ramganga River are the Kho, Gangan, Kosi, Dhela, Bhakara, East and West Begul and Deoha (Gorra). In present study, assessment of River Ramganga carried out between the latitude 29°18'36.17" N to 28°17'40.89" N and the longitude 78°38'12.07" E to 79°22'7.48" E (from Kalagarh to Bareilly) in districts of Uttar Pradesh (U.P) and Uttrakhand (U.K) covering 236 km of stretch.

Pursuant to the directions of Hon'ble High Court, Allahabad of U.P in the matter of Pollution in river Ganga vide PIL 4003 of 2006 dated 21/12/2010, Chairman Central Pollution Control Board (CPCB) had constituted a committee for assessment of water quality of tributaries which merge with river Ganga. The problem of color in downstream stretch of River Ramganga is encountered due to discharges of untreated/partially treated industrial waste water containing lignin and other organic load. The significant quantity of pollution load is transported by the Rivulets namely Dhella, Bahela, Kosi and Pilakhar to river Ramganga. It is estimated that total wastewater discharges into river Ramganga directly or indirectly from Uttarakhand is 162 MLD and from Uttar Pradesh 73 MLD. The pollution load in turn affects the water quality of river Ganga at Kannauj.

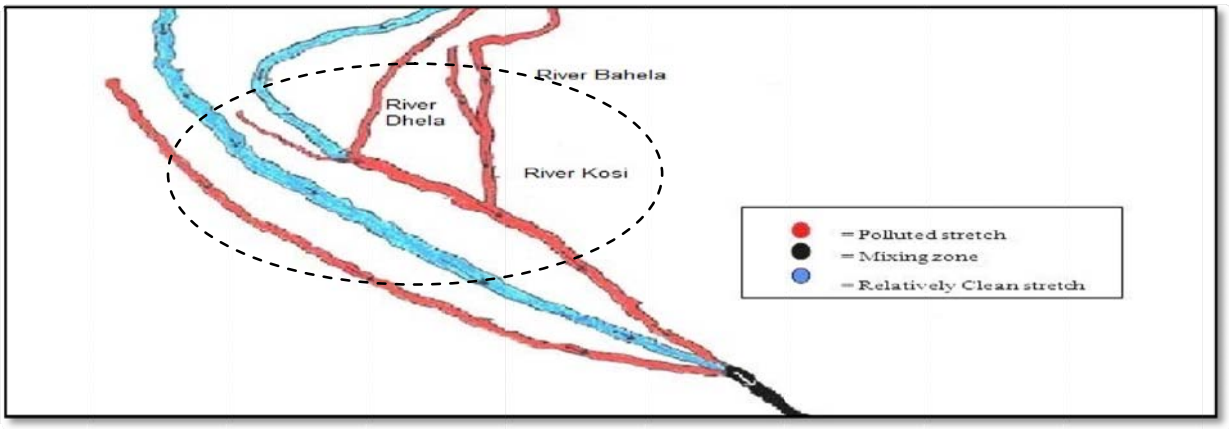


Figure 5.16: Map showing problem area at River Ramganga

Grab samples were collected from 17 locations (Table 5.13) and analyzed for physio-chemical parameters such as pH, TDS, BOD, COD, DO, Chloride and Conductivity.

Table 5.13 : Point Sources of River

S.No.	Code	Source	Point Source	Location
1.	R2	River	Kho	Sherkot
2.	R3	River	Gagan	Delhi-Moradabad Road
3.	R4	River	Bahela	Lohia U/s
4.	R5	River	Bahela	Tanda D/s
5.	R6	River	Dhela	Bhojpur
6.	R7	River	Kosi	Rampur-Delhi Road
7.	R10	River	Bhakra	Delhi-Bareilly Road
8.	R11	River	Begul	2 km d/s of previous location
9.	R12	River	Shankhu	Delhi-Bareilly Road
10.	R13	River	Deroyian	Uccha village, Bareilly
11.	R14	River	Nakatiya	Shahpur Road
12.	R16	River	Aril-U/S	Chadausi Road
13.	R17	River	Aril-D/s	Rasoolpur village, Baduon, Bareilly
14.	D1	Drain	Seohara	Seohara village
15.	D2	Drain	Dwarika-Sugarmill drain	Afzalgarh, Dwarikeshpur
16.	D3	Drain	Rampur Drain	Patwai
17.	D4	Drain	Moradabad drain	Moradabad Bypass

Findings:

Based on the study following are the findings:

1. River Dhela, Bahela, Kosi, Rampur Drain, Moradabad drain are the causes of deterioration of water quality of River Ramganga. Water Quality of river Ramganga at Afzalgarh and Agwanpur meets Primary Water Quality Criteria for Bathing Water with respect to DO and BOD.
2. River Dhela carries BOD load of 56088 kg/day and it deteriorates water quality of River Ramganga. River Ramganga (after confluence of Dhela at Khatghar) water quality does not meet Primary Water Quality Criteria for Bathing Water as BOD concentration was found 09 mg/l. BOD load of Ramganga increases from 3000 kg/day (Agwanpur) to 24516 kg/day (Khatghar).
3. Moradabad Drain, Rampur Drain, River Kosi and Gangan meet River Ramganga between Khatghar and Shahabad Road. Moradabad drain carries BOD load of 29400 kg/day as it carries industrial and domestic wastewater of Moradabad whereas BOD load of Rampur drain was 15600 kg/day.

4. Water quality of river Kosi deteriorates after confluence of River Bahela. River Bahela carries industrial and domestic wastewater of Kashipur (Uttrakhand) with BOD load of 5985 kg/day. BOD and DO concentration of river Kosi after confluence (at Rampur Bridge) was 11 mg/l and 2.6 mg/l respectively which violate the prescribed norms.
5. Nohra drain carries industrial wastewater of Sugar Mills and merges with River Gangan. Nohra drain has the BOD load of 6080 kg/day. However, BOD concentration of Gangan was always less than 3 mg/l and DO concentration was more than 4 mg/l.
6. BOD load of Ramganga decreases from 24516 kg/day (Khatghar) to 11937 kg /day (Shahabad road). However, water quality of Ramganga at Shahabad road does not meet Primary Water Quality Criteria for Bathing Water with respect to DO and BOD.
7. Flow of river Ramganga increases from 2595 MLD (Shahabad road) to 9128 MLD (Bareilly-Baduaon road) as River Bhakra, Begul and Shanku join river Ramganga and provide dilution to Ramganga. Similarly, BOD load also increases from 11937 kg/day (Shahabad road) to 34686 kg/day (Bareilly-Baduaon road) as untreated sewage of Bareilly city amalgamate with River Ramganga via River Deroyian and Nakatiya.
8. River Bhakra, Begul and Shanku mostly carry fresh water whereas Deroyian and Nakatiya River carries sewage waste water from Bareilly city. DO Concentration of both Deroyian and Nakatiya River was less than 4 mg/l whereas BOD concentration was more than 3 mg/l.
9. BOD concentration of River Ramganga decreases from 4.6 mg/l (Shahabad road) to 3.8 mg/l (Bareilly-Baduaon road) whereas DO concentration increases from 3.8 mg/l (Shahabad road) to 6.8 mg/l (Bareilly-Baduaon road).
10. River Aril joins River Ramganga after Bareilly-Baduaon road. Industrial wastewater from Bilari discharge into said river and ultimately deteriorate River Ramganga.

Recommendations

Based on the study following recommendations have been suggested:

1. Untreated effluent/waste water of industries located in Uttarakhand and Uttar Pradesh shall not be discharged either into River Ramganga or into adjoining tributaries/drain.
2. Sewage Treatment plants shall be installed at Kashipur, Moradabad, Rampur, Bareilly so that untreated sewage shall not be discharged.
3. Uttar Pradesh and Uttrakhand Pollution Control Board shall ensure that ETPs installed by individual industries are operated properly and meet the desired standards.

4. Uttar Pradesh and Uttrakhand Pollution Control Board shall identify the defaulting industries discharging their untreated/partially treated effluent either into Ramganga river or into adjoining tributary/drain and issue closure directions to those identified defaulting industries under section 33 (A) of the Water (Prevention & Control of Pollution) Act, 1974.
5. Dumping of Municipal Solid waste on river bank be stopped immediately and Nagar Nigam shall explore the possibility to explore construction of engineered landfill sites.
6. Uttar Pradesh and Uttrakhand State Pollution Control Board shall make a comprehensive pollution load assessment and evolve an action plan to bring the effluent discharges within the prescribed limit.
7. Irrigation Departments and Groundwater Board and other stake holders in both the states shall evolve a programme to ensure minimum flow in the river.

5.4 NATIONAL AIR QUALITY MONITORING PROGRAMME (NAMP)

5.4.1 Background

Central Pollution Control Board in association with State Pollution Control Boards established National Ambient Air Quality Monitoring Network in the country. The beginning of ambient air quality monitoring was made in year 1982 initiating monitoring of three criteria pollutants i.e. Suspended Particulate Matter (SPM), Sulphur Dioxide (SO_2) and Nitrogen Dioxide (NO_2).

National Ambient Air Quality Monitoring network was established during year 1984–85 with 9 stations in Agra, Anpara & Delhi and gradually additional stations have been established over the years. The National Ambient Air Quality Standards (NAAQS) notified in 1984 and revised in 1994 wherein three pollutants namely Carbon Monoxide (CO), Lead (Pb), and Respirable Suspended Particulate Matter (RSPM/PM_{10}). were added The parameter Ammonia (NH_3) was added in year 1996. The NAAQS were revisited and revised in November 2009 including PM_{10} (Particulate Matter less than 10 micron), $PM_{2.5}$ (Particulate Matter less than 2.5 micron), SO_2 (Sulphur Dioxide), NO_2 (Nitrogen Dioxide), CO (Carbon Monoxide), O_3 (Ozone), NH_3 (Ammonia), Benzene (C_6H_6), Benz-o-pyrene (BaP), Lead (Pb), Arsenic (As), and Nickel (Ni).

The revised Standards have done away with area classification based on land-use so that industrial areas shall also confirm to the same standards as residential areas. The standards are applicable uniformly with the exception of NO_2 and SO_2 in the Ecologically Sensitive Areas while suspended particulate matter (SPM) as air quality parameter has been replaced with fine particulate matter ($PM_{2.5}$).

The National Ambient Air Monitoring Programme (NAMP) network presently comprises 700 sanctioned manual monitoring stations located in 300 cities/towns and industrial areas across the country out of which 523 manual monitoring stations located in 215 cities/towns and industrial areas across the country are operational (Table 5.14). Growth of air quality monitoring network is presented in Figure 5.17. The number of sanctioned and operating monitoring stations during the 2011-12 for various states and Union Territories are presented in Figure 5.18 and 5.19 respectively. Ambient air quality data collected under NAMP is processed statistically (easy to understand), identification of non attainment cities with respect to each parameters.

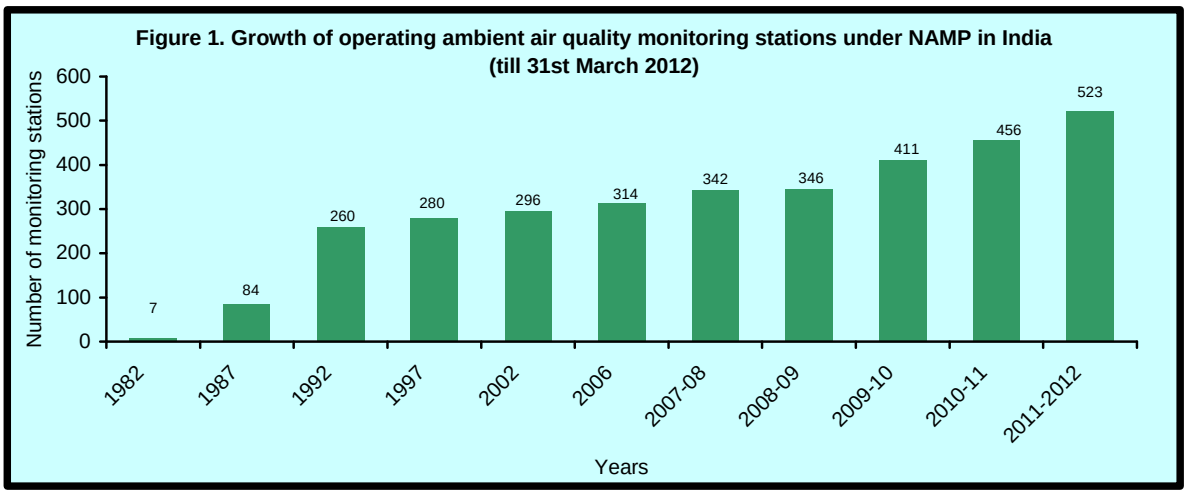


Figure 5.17 : Growth of operating ambient air quality monitoring stations under NAMP (till 31st March 2012)

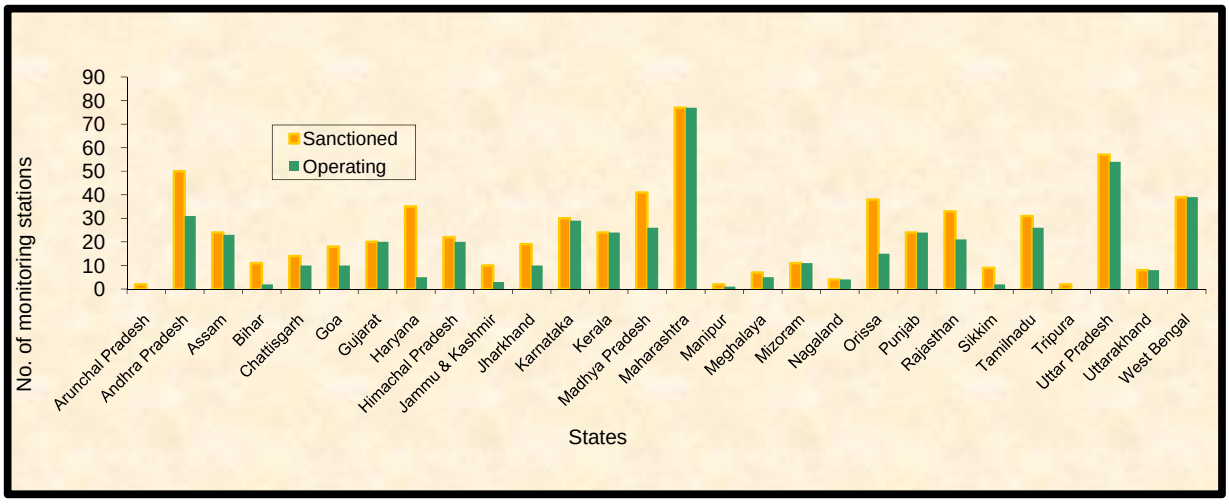


Figure 5.18 : Total number of sanctioned and oprational air quality monitoring stations in Indian states during year 2010-2011

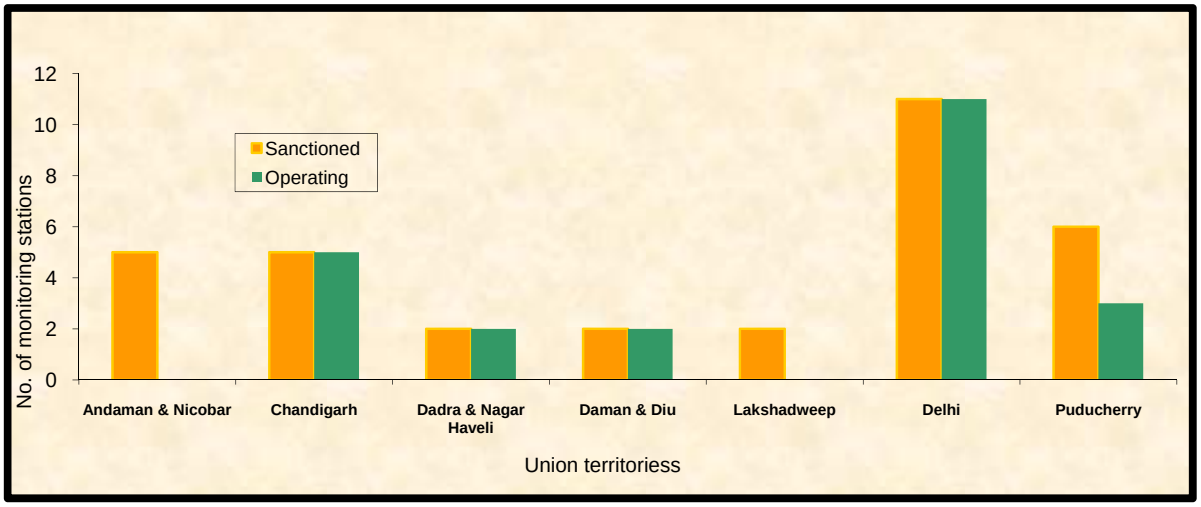


Figure 5.19: Total No. of Sanctioned and operational Air Quality Monitoring Stations in Union Territories during year 2010-2011

Table 5.14 : National Air Monitoring Programme (NAMP) Network at a Glance (as on 31st March 2012)

A. Air Quality Monitoring Stations	
1. Total No. of Ambient Air Quality Station sanctioned	**700**
i) No. of State/UT covered	**28 States & 7 Union Territories**
ii) No. of cities covered NAMP	**300**
2. Total No. of Operating stations	**523**
i) No. of State/UT covered	**26 states, 5 Union Territories**
ii) No. of cities covered	**215**
iii) No. of stations in Sensitive Areas other than Ecologically sensitive area notified by Govt. of India	**14**
3. No. of stations to be operationalized	**160**
i) No. of state/UT covered	**21 states, 4 Union Territories**
ii) No. of cities covered	**100**
4. Target on XIth five year plan	**700 (Achieved)**
B. Status of Air Quality in India	
i) Total Number of criteria/regular parameters monitored for ambient air quality	**03 - SO_2, NO_2 & PM $_{10}$ (Sulphur Dioxide, Nitrogen Dioxide & Particulate Matter ≥ 10 micron size)**
ii) Other notified parameters monitored in selected cities/locations	**PAH (BaP), CO, O_3, NH_3, $PM_{2.5}$, C_6H_6 , Pb, Ni, As**

iii) Percentage & Number of cities exceeding the permissible limit w.r.t. PM_{10} and NO_2	**62% - PM_{10} – 131 cities 9% - NO_2 – 18 cities**
iv) Total no. of Metro cities	**53**
v) Total no. of operating stations in metro cities	**194**
vi) Percentage & Number of metro cities exceeding the permissible limit w.r.t. PM_{10} and NO_2	**12% - NO_2 – 06 cities 84 % - PM_{10} – 41 cities**
C. Non Attainment/Non Complied Cities	
i) Total non-attainment cities in 2005	**72 (23 States)**
ii). No. of Non Attainment cities in 2012 (Tentative list declared) on the basis of 2008-2010 AAQ data (latest, as per revised standard)	**95 (23 States)**
D. Strengthening of Ambient Air Quality Stations (The Network - NAMP)	
i) Strengthening of AAQMS in 2010 - 2011	**143 Ambient Air Quality Stations**
ii) Strengthening of AAQMS in 2011-2012	**35 Ambient Air Quality Stations**
E. Expenditure incurred under NAMP (2010-2011)	
i) Strengthening ii) Operation & Maintenance cost	**2.34 crore (from Cess fund) 7.07 crore**
iii) Total Expenditure	**9.41 Crore**
F. Expenditure (Payment) incurred (2011-2012)	
i) Strengthening	**Rs. 2.257 Crore**
ii) Operation & Maintenance cost	**Rs. 10.89 crore**
iii) Total Expenditure	**13.147 Crore (Total)**

Under NAMP three criteria pollutants viz. PM_{10} (Particulate Matter having an aerodynamic diameter less than or equal to 10 µm), Sulphur dioxide (SO_2) and Nitrogen dioxide (NO_2) were identified for regular monitoring at all locations. Additional parameters like Carbon monoxide (CO), Ammonia (NH_3), Lead (Pb) and Ozone (O_3) are being monitored at selected locations. The other parameters as notified in revised NAAQS viz. $PM_{2.5}$ (Particulate Matter having an aerodynamic diameter less than or equal to 2.5 µm), Benzo(a)pyrene (BaP), Arsenic (As) and (Ni) are slowly being added under the monitoring network. The monitoring of meteorological parameters such as wind speed, wind direction, relative humidity and temperature has also been integrated with air quality monitoring. The monitoring of pollutants is carried out for 24 hours (4-hourly sampling for gaseous pollutants and 8-hourly sampling for particulate matter) with twice a week frequency to have 104 observations in a year.

5.4.2 Objectives of NAMP

i). To determine the status and trends of ambient air quality;
ii). To ascertain whether the prescribed ambient air quality standards are violated;
iii). To identify non-attainment cities with respect to national standards and;
iv). To obtain the knowledge and understanding necessary for developing preventive and corrective measures.

5.4.3 Agencies involved in the monitoring

Besides CPCB including its Zonal offices, the monitoring is being carried out with the help of State Pollution Control Boards; Pollution Control Committees and National Environmental Engineering Research Institute (NEERI), Nagpur. CPCB co-ordinates with these agencies to ensure uniformity, consistency of air quality data and provides technical and financial support for operating monitoring stations. As the monitoring under the NAMP is being operated through various monitoring agencies, large number of personnel and equipment are involved in the sampling, chemical analyses, data reporting etc. because of which personnel biases are sometimes reflected in air quality data. This limitation needs to be considered by the users while using the data.

5.5 AIR QUALITY STATUS IN METROPOLITAN CITIES DURING YEAR 2011

Urbanization in India is more rapid around the major cities in India. Population growth has been accelerated in cities due to migration of rural population. Increase in industrial activities, population both endemic and floating and vehicular population etc. has led to a rapid increase in environmental problems, increasing air pollution. 53 cities with population ≥ 10 lacs have identified as Metropolitan cities, according to census 2001. There are 207 monitoring stations in 49 metropolitan cities, out of these, 49 cities are covered under NAMP (Table 5.15). Agra falls under ecologically sensitive area, while others are industrial/residential areas.

Table 5.15. Air Quality Monitoring Stations in Metropolitan Cities

Zone	State	City	Total No. of Sanctioned Stations	Total No. of Operating Stations
North Zone	Delhi (11)	Delhi	11	**11**
	Haryana (2)	Faridabad	3	**2**
	Punjab (6)	Amritsar	2	**2**
		Ludhiana	4	**4**
	Uttar Pradesh	Agra	6	**6**

Zone	State	City	Total No. of Sanctioned Stations	Total No. of Operating Stations
	(28)	Allahabad	2	**2**
		Kanpur	9	**9**
		Lucknow	5	**5**
		Meerut	2	**2**
		Varanasi	2	**2**
		Ghaziabad	2	**2**
	Jammu & Kashmir (0)	Srinagar	0	**0**
	Chandigarh (5)	Chandigarh	5	**5**
East Zone	Bihar (2)	Patna	2	**2**
	Jharkhand (4)	Dhanbad	1	**1**
		Jamshedpur	4	**2**
		Ranchi	4	**1**
	West Bengal (13)	Asansol	3	**3**
		Kolkata	10	**10**
South Zone	Andhra Pradesh (19)	Hyderabad	9	**9**
		Vijayawada	2	**2**
		Visakhapatnam	8	**8**
	Karnataka (9)	Bangalore	9	**9**
	Kerala (17)	Kochi	7	**7**
		Kozhikode	2	**2**
		Thrissur	1	**1**
		Mallapuram	1	**1**
		Thiruvananthapuram	4	**4**
		Kannur	0	**0**
		Kollam	2	**2**
	Tamilnadu (22)	Chennai	11	**11**
		Coimbatore	3	**3**
		Madurai	3	**3**
		Tiruchirappalli	5	**5**
West Zone	Gujarat (15)	Ahmedabad	9	**6**
		Rajkot	2	**2**
		Surat	3	**3**
		Vadodara	6	**4**
	Maharashtra (22)	Pune	4	**4**
		Mumbai	3	**3**
		Nagpur	7	**7**
		Nashik	4	**4**
		Vsai-virar	0	**0**
		Aurangabad	4	**4**

Zone	State	City	Total No. of Sanctioned Stations	Total No. of Operating Stations
	Rajasthan (15)	Jaipur	9	**6**
		Jodhpur	9	**6**
		Kota	6	**3**
Central Zone	Madhya Pradesh (10)	Bhopal	8	**4**
		Indore	3	**3**
		Jabalpur	2	**1**
		Gwalior	2	**2**
	Chattisgarh (7)	Raipur	3	**3**
		Durg-bhilainagar	4	**4**
	18	**53**	**232**	**207**

Remarks: Figures within parentheses represent number of operating monitoring stations in metro cities of the state

Air quality data in these 49 cities were analyzed and compared with NAAQS to assess the status of air quality. Qualitative assessment on extent of pollution level is done based on exceedance factor, which is a ratio of annual mean concentration of a pollutant and its annual standard. The Exceedence Factor (EF) is calculated as follows:

$$\text{Exceedence Factor} = \frac{\text{Observed annual mean concentration of criteria pollutant}}{\text{Annual standard for the respective pollutant and area class}}$$

The four air quality categories are:

- Critical pollution (C) : when EF is > 1.5;
- High pollution (H) : when the EF is between 1.0 - <1.5;
- Moderate pollution (M) : when the EF between 0.5 - <1.0; and
- Low pollution (L): when the EF is < 0.5.

It is obvious from the above categorization, that the locations in either of the first two categories are actually not meeting the standards, although, with varying magnitude. Those, falling in the third category are meeting the standards as of now but likely to exceed the standards in future if pollution is unabatedly continues to increase. However, the locations in Low pollution category have a rather clean air quality and such areas are to be maintained at low pollution level by way of adopting preventive and control measures of air pollution. The pollution level classification is given in Table 5.16.

Table 5.16 : Pollution Level Classification

Pollution level	Annual Mean Concentration Range (µg/m³)					
	Industrial, Residential, Rural & others areas			Ecologically Sensitive Area		
	SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}
Low (L)	0-25	0-20	0-30	0-10	0-15	0-30
Moderate (M)	26-50	21-40	31-60	11-20	16-30	31-60
High (H)	51-75	41-60	61-90	21-30	31-45	61-90
Critical (C)	>75	>60	>90	>30	>45	>90

Based on the EF, air quality has been categorized in respect of three criteria pollutants (SO_2, NO_2 and PM_{10}) for the year 2011.

Analysed data for 49 metropolitan cities in terms of pollution level based on exceedance factor are given in Tables 5.17, 5.18 and 5.19. Annual Mean Concentration for SO_2, NO_2 and PM_{10} are depicted in Figures 5.20 to 5.22 respectively. While 42 and 8 cities exceeded the in prescribed standards for PM_{10} And NO_2, respectively, SO_2 was within limits all 49 cities. SO_2 levels were low except for Ghaziabad, Dhanbad, Jamshedpur and Pune wherein moderate levels were observed.

As for NO_2, 13 cities are in the low category, 28 cities are in the moderate category, therefore 41 cities out of 49 metropolitan cities comply with the standards for Nitrogen Dioxide. 6 cities fall in the high category and 2 (Kolkata & Delhi) in the critical and therefore exceed the air quality standard.

With respect to PM_{10}, 1 city and 6 cities are in the low and moderate category respectively.. 6 cities fall in the high category and 36 in the critical category therefore 42 cities exceeded the air quality standard with respect to PM_{10}.

Table 5.17: Air Quality at Metropolitan cities during year 2011

State	City	Total No. of Operating Stations	Annual Average in µg/m³					
			SO_2	Air Quality	NO_2	Air Quality	PM_{10}	SO_2
Andhra Pradesh	Hyderabad	9	5	L	28	M	74*	H
	Visakhapatnam	8	13	L	21	M	80*	H
	Vijayawada	2	6	L	11	L	90*	H
Bihar	Patna	2	4	L	36	M	158*	C
Chandigarh	Chandigarh	5	2	L	16	L	102*	C
Chattisgarh	Raipur	3	15	L	42*	H	310*	C
	Durg-Bhilainagar	4	8	L	22	M	104*	C
Delhi	Delhi	11	6	L	61*	C	222*	C

State	City	Total No. of Operating Stations	Annual Average in µg/m³					
			SO_2	Air Quality	NO_2	Air Quality	PM_{10}	SO_2
Gujarat	Ahmedabad	6	14	L	25	M	83*	H
	Surat	3	20	L	29	M	106*	C
	Vadodara	4	18	L	30	M	92*	C
	Rajkot	2	13	L	18	L	98*	C
Haryana	Faridabad	2	20	L	43*	H	174*	C
Jharkhand	Jamshedpur	2	36	M	48*	H	152*	C
	Dhanbad	1	35	M	36	M	207*	C
	Ranchi	1	18	L	35	M	165*	C
Karnataka	Bangalore	9	4	L	28	M	91*	C
Kerala	Kochi	7	3	L	13	L	38	M
	Kozhikhode	2	2	L	8	L	46	M
	Thrissur	1	2	L	14	L	33	M
	Mallapuram	1	2	L	5	L	30	L
	Thiruvananthapuram	4	10	L	23	M	58	M
	Kollam	2	4	L	20	L	53	M
Madhya Pradesh	Indore	3	12	L	14	L	132*	C
	Bhopal	4	4	L	16	L	170*	C
	Jabalpur	1	2	L	25	M	73*	H
	Gwalior	2	12	L	20	L	311*	C
Maharashtra	Mumbai	3	5	L	33	M	116*	C
	Pune	4	32	M	58*	H	113*	C
	Nagpur	7	8	L	35	M	108*	C
	Nashik	4	25	L	27	M	96*	C
	Aurangabad	4	8	L	31	M	83*	H
Punjab	Ludhiana	4	11	L	28	M	221*	C
	Amritsar	2	14	L	26	M	210*	C
Rajasthan	Jaipur	6	6	L	37	M	139*	C
	Jodhpur	6	5	L	23	M	168*	C
	Kota	3	7	L	31	M	139*	C
Tamilnadu	Chennai	11	9	L	24	M	92*	C
	Coimbatore	3	4	L	26	M	102*	C
	Madurai	3	11	L	24	M	44	M
Uttar Pradesh	Kanpur	9	10	L	31	M	183*	C
	Ghaziabad	2	31	M	39	M	231*	C
	Agra	6	3	L	23	M	155*	C
	Varanasi	2	17	L	20	L	127*	C
	Meerut	2	5	L	45*	H	123*	C
	Allahabad	2	5	L	20	L	258**	C
	Lucknow	5	8	L	33	M	189*	C
West Bengal	Kolkata	10	12	L	65*	C	113*	C
	Asansol	3	7	L	56*	H	145*	C
Total	**49**	**207**						

*L: Low, M: Moderate, H: High, C: Critical *Concentration exceeding NAAQS ; Low, moderate, high, critical classification based on Pollution Level Classification, '*' Cities where annual mean concentration of exceeded the NAAQS of 50 µg/m³ for SO_2 , 40 µg/m³ for NO_2 & 60 µg/m³ for PM_{10} for Residential/ industrial / other area.*

Table 5.18 : Number of Metropolitan cities with Air Quality exceeding the NAAQS (Based on annual average data)

Category	Metropolitan cities (population > 10 lacs)		
	SO_2	NO_2	PM_{10}
Not exceeding NAAQS	49	41	7
Exceeding NAAQS	0	8	42
Total cities considered	**49**	**49**	**49**

Table 5.19 : Number of Metropolitan cities in low, moderate, high & critical air quality (Based on annual average data)

Category	Metropolitan cities (population > 10 lacs)		
	SO_2	NO_2	PM_{10}
Low	45	13	1
Moderate	4	28	6
High	0	6	6
Critical	0	2	36
Total cities considered	**49**	**49**	**49**

Among the metropolitan cities 8 (15%) and 42 (79%) cities exceeded the NAAQS with respect to NO_2 and PM_{10}. While none of the cities exceeded the standard limit with respect to SO_2 (Table 5.18).

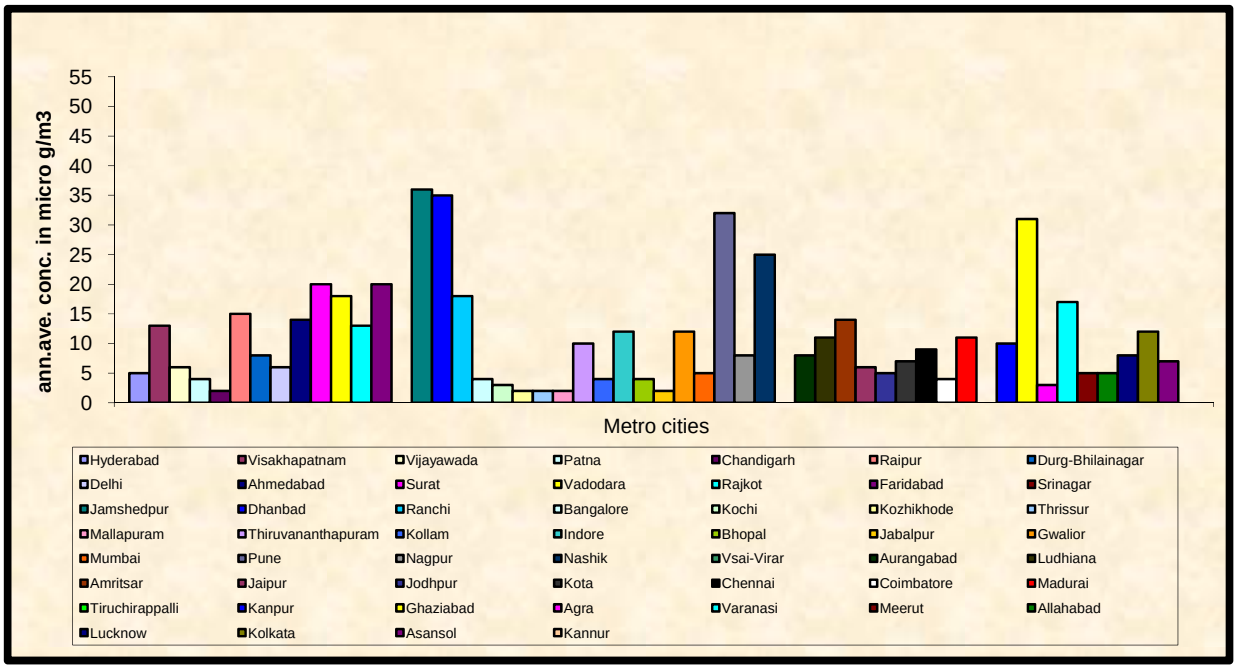


Figure 5.20. SO_2 levels (annual) in 53 metro cities during year 2011

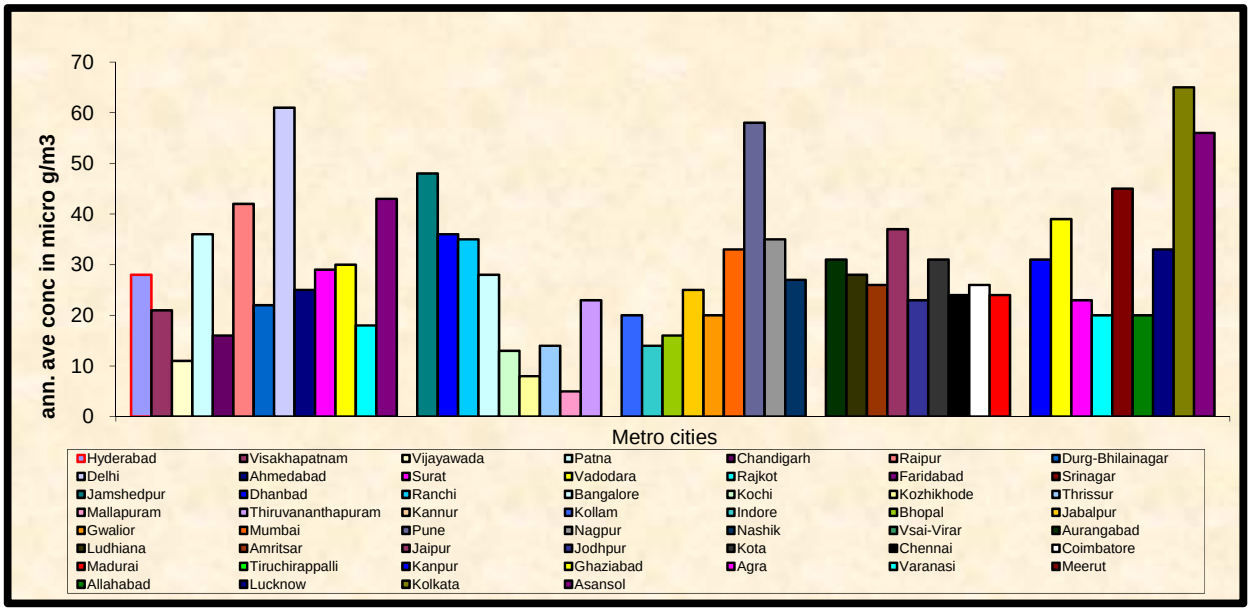


Figure 5.21 : NO_2 levels (annual) in 53 metro cities during year 2011

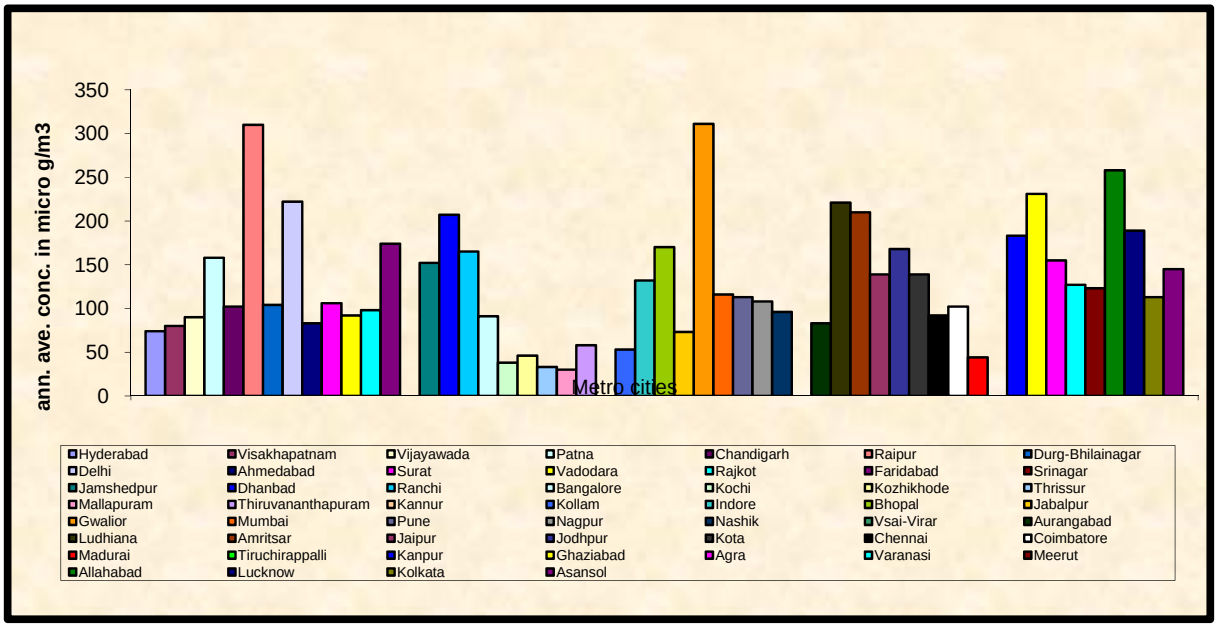


Figure 5.22. PM10 levels (annual) in 53 metropolitan cities during year 2011

Air Quality trend in Metropolitan Cities

Table 5.20 presents the trend of three parameters (SO_2, NO_2 and PM_{10}) in 53 Metropolitan Cities for the last four years.

Table 5.20 : Ambient Air Quality Trend in Metropolitan Cities

State	City	Year 2008			Year 2009			Year 2010			Year 2011		
		SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}
Andhra Pradesh	Hyderabad	5	26	85	5	23	81	5	24	79	5	28	74
	Visakhapatnam	10	30	81	11	26	93	7	16	71	13	21	80
	Vijayawada	5	28	96	6	15	87	6	14	93	6	11	90
Bihar	Patna	7	39	120	5	37	146	7	40	181	4	36	158
Chandigarh	Chandigarh	2	15	95	2	15	81	2	16	92	2	16	102
Chattisgarh	Raipur	19	43	192	18	46	263	15	43	289	15	42	310
	Durg-Bhilainagar	17	25	109	15	25	112	9	22	109	8	22	104
Delhi	Delhi	6	57	214	6	50	252	5	55	261	6	61	222
Gujarat	Ahmedabad	12	20	88	16	21	94	15	21	95	14	25	83
	Surat	17	24	87	19	26	90	16	24	76	20	29	106
	Vadodara	14	28	77	16	30	86	17	29	93	18	30	92
	Rajkot	11	14	105	11	15	105	13	17	96	13	18	98
Haryana	Faridabad	13	24	150	15	23	154	18	29	164	20	43	174
Jammu & Kashmir	Srinagar	-	-	-	-	-	-	-	-	-	-	-	-
Jharkhand	Jamshedpur	37	51	172	36	49	172	35	48	153	36	48	152
	Dhanbad	19	44	131	17	41	164	15	36	184	35	36	207
	Ranchi	18	33	173	18	32	179	19	35	172	18	35	165
Karnataka	Bangalore	15	41	100	14	37	112	14	31	89	4	28	91
Kerala	Kochi	4	12	43	4	12	42	4	11	36	3	13	38
	Kozhikhode	2	7	34	2	9	32	2	9	42	2	8	46
	Thrissur	-	-	-	-	-	-	2	7	31	2	14	33
	Mallapuram	-	-	-	-	-	-	2	5	30	2	5	30
	Thiruvananthapuram	10	26	67	9	21	61	9	24	56	10	23	58
	Kannur	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Kollam	-	-	-	-	-	-	3	15	47	4	20	53
Madhya Pradesh	Indore	10	19	196	9	17	183	14	18	120	12	14	132
	Bhopal	6	20	102	7	17	119	9	18	133	4	16	170
	Jabalpur	2	25	136	2	24	136	2	25	135	2	25	73
	Gwalior	9	16	163	10	18	187	12	20	308	12	20	311
Maharashtra	Mumbai	9	40	127	6	41	117	4	19	97	5	33	116
	Pune	22	37	103	25	40	88	29	39	82	32	58	113
	Nagpur	8	33	114	6	31	101	7	33	113	8	35	108
	Nashik	30	25	79	23	29	89	21	26	77	25	27	96
	Vsai-Virar	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aurangabad	8	20	75	7	25	86	6	21	75	8	31	83
Punjab	Ludhiana	10	40	271	9	38	253	9	32	214	11	28	221
	Amritsar	-	-	-	15	35	190	14	36	219	14	26	210
Rajasthan	Jaipur	6	35	127	6	36	151	6	37	164	6	37	139
	Jodhpur	6	24	176	6	23	140	6	22	181	5	23	168
	Kota	9	25	125	6	24	91	10	29	132	7	31	139
Tamilnadu	Chennai	9	14	63	9	17	73	9	15	59	9	24	92

State	City	Year 2008			Year 2009			Year 2010			Year 2011		
		SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}
	Coimbatore	6	30	75	6	27	77	5	27	78	4	26	102
	Madurai	10	24	42	10	25	42	11	25	47	11	24	44
	Tiruchirappalli	-	-	-	-	-	-	-	-	-	-	-	-
Uttar Pradesh	Kanpur	7	24	212	8	31	212	7	34	203	10	31	183
	Ghaziabad	20	16	236	29	31	239	30	37	290	31	39	231
	Agra	6	23	198	6	21	185	5	20	185	3	23	155
	Varanasi	16	19	106	17	20	125	18	20	127	17	20	127
	Meerut	10	42	115	8	44	119	8	47	166	5	45	12
	Allahabad	8	37	181	3	24	160	4	24	218	5	20	258
	Lucknow	8	36	190	8	36	197	8	34	204	8	33	189
West Bengal	Kolkata	8	64	103	11	68	126	11	62	99	12	65	113
	Asansol	7	74	135	8	55	154	8	66	141	7	56	145

Note: Source: Data as reported by CPCB/SPCBs/PCCs/NEERI

'-' Data not available. BDL – Below Detection Limit (i.e. less than 4 micrograms per cubicmeter for SO_2 and less than 9 micrograms per cubicmeter for NO_2). Data of Agra city is of Taj Mahal is sensitive Area. Data as reported in monthly summary sheet\Environmental Data Bank\Hard copy available as on date. National Ambient Air Quality Standard for Residential, Industrial, Rural and others Areas (Annual average) for SO_2 = 50 microgramme per cubic metre, NO_2 = 40 microgramme per cubic metre and PM_{10} = 60 microgramme per cubic metre.
NA = No Ambient Air Quality Stations operating under NAMP in these cities during the period.
Annual average concentration in µg/m3

5.6 AIR QUALITY TREND FOR MEGA CITIES (DELHI, MUMBAI, KOLKATA, AND CHENNAI)

Based on Air Quality Monitoring data generated from Air Quality Monitoring Stations under NAMP, the trends in annual average concentration of Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2) and Respirable Suspended Particulate Matter (RSPM/PM_{10}) have been determined in Delhi, Mumbai, Chennai and Kolkata were analysed and depicted (Figure 5.23).

Sulphur Dioxide levels in all 4 mega cities has been within the National Ambient Air Quality Standards [(NAAQS of Sulphur Dioxide (SO_2) 50 µg/m3]. A decreasing trend has been observed in ambient sulphur dioxide levels in Delhi which may be due to various interventions such as reduction of sulphur in diesel, use of cleaner fuel such as CNG (implemented in April, 2001), change in domestic fuel from coal to LPG etc.

Nitrogen Dioxide levels in Delhi and Kolkata exceeded National Ambient Air Quality Standards [(NAAQS of Nitrogen Dioxide (NO_2) - 40 µg/m3] and also show an increasing trend. Mumbai and Chennai indicated fluctuating trend and Chennai is well within the NAAQS. With respect to Respirable Suspended Particulate Matter (RSPM/PM_{10}), Mumbai, Kolkata and Delhi exceeded the NAAQS almost in all the years. The reasons being emissions from gensets, small scale

industries, biomass incinerators, suspension of road dust, natural dust, commercial and domestic use of fuel and vehicular emission etc. The air quality in Delhi with respect to RSPM/PM_{10} depicted an increasing trend, whereas Mumbai and Kolkata have shown a reduction in the concentration after year 2003.

In spite of various interventions strategies to mitigate ambient NO_2 and PM_{10}, the reason of persistence of the problem can largely be attributed to the increasing numbers of vehicles, which are the major sources of NO_2 and PM_{10}.

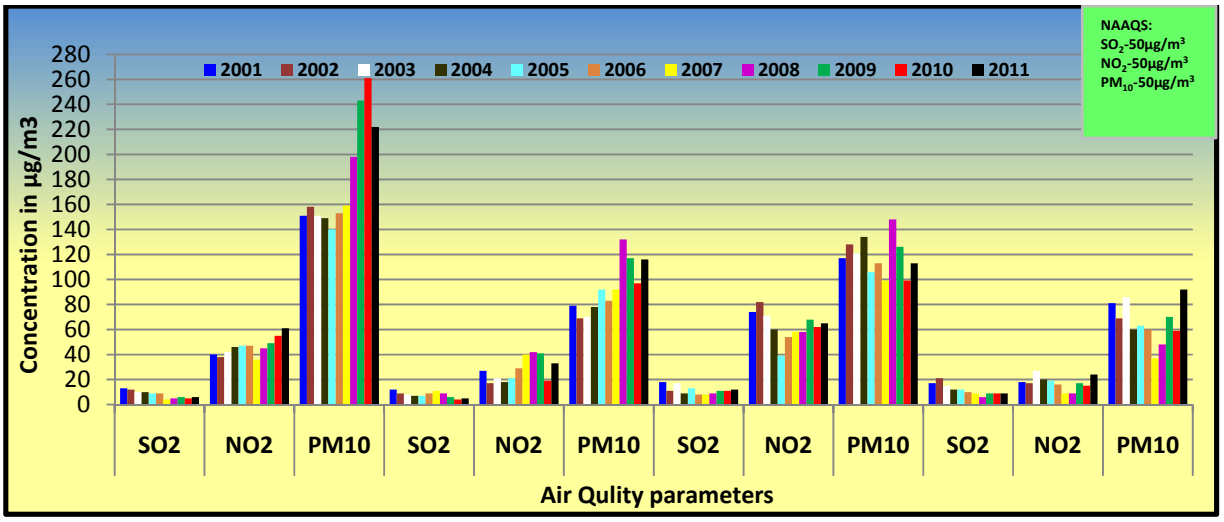


Figure 5.23 Air quality Trends in Four Mega Cities

5.7 SPECIFIC OBJECTIVE ORIENTED MONITORING

Basides monitoring under NAMP, specific Objective Oriented Monitoring viz. Assessment of air and noise monitoring during Deepawali, Assesment of Air Quality of Kasba Kolkata and Monitoring of VOC in urban air at traffic intersection of different town and coke oven industries have also been undertaken during the year.

5.7.1 Ambient Air and Noise Pollution Levels during Deepawali 2011

The Central Pollution Control Board, conducted an in-depth Ambient Air quality and Noise monitoring studies during Deepawali festival for the year 2011 (October 26, 2011) to assess the overall impact of bursting crackers on Ambient Air Environment. It may be stated that the prime festival in North India is celebrated at the juncture of Autumn and Winter. The meteorological conditions plays a vital role during the period for dilution and dispersion of generated additional air pollutants lowering of ambient temperature, reduced mixing height, changing wind

direction, low or no wind velocity and starting of dry weather spells added pollution load due to festival aggravates the overall environmental conditions.

Delhi:

Intensive ambient air quality monitoring was undertaken during the festival at selected seven (07) locations and ambient noise monitoring was undertaken at nine (09) locations across the city. The air quality data also obtained from eleven (11) on-line stations.

The Ambient noise level monitoring was carried out at Lajpat Nagar, Mayur Vihar (Phase – II), Pitam Pura, Kamla Nagar, Dilshad Garden, East Arjun Nagar, Ansari Nagar (AIIMS), Connaught Place and ITO between 18.00 hours & 24.00 hours (during Deepawali celebration hours) on October 26, 2011. Ambient Noise level monitoring data for Pre-Deepawali background monitoring was carried out at same locations & time on October 19, 2011. The noise level data is presented in Table-5.21. Round-the-clock Ambient Air quality monitoring was carried out on October 26, 2011 (Deepawali day) at seven monitoring stations of CPCB namely BSZ Marg (ITO), Pitampura, Siri Fort, Janakpuri, Nizamuddin, Shahzada Bagh, and Shahdara. The air quality data is presented in Table-5.22. The data obtained from eleven (11) on-line air quality monitoring stations in Delhi are depicted at Table-5.23. Meteorological profile (temperature, relative humidity, wind speed, wind direction and mixing height) was also monitored and the data is presented at Table-5.25. Average ambient temperature on October 26, 2011 was 26.4^{0}C as compared to 21.2^{0}C in 2010; relative humidity was 39 % in the year 2011 as compared to 75 % in 2010. Mixing height increased to 255 meters during year 2011 as compared to 151 meters year 2010.

The findings of the monitoring studes indicated that:

Noise level during Deepawali, 2011 showed a slight increase at three locations, decreased at three, while no change at remaining locations as compared to Deepawali 2010 (November 05, 2010). Increase in Noise Level at these locations could be attributed to bursting of noisy crackers. The maximum Noise Level was found to have increased to 91 dB(A) in the year 2011 from 85 dB(A) observed in during year 2010.

Air pollutant levels during 2011 Deepawali Day (October 26, 2011) were found to be lower as compared to Deepawali, 2010 (November 05, 2010.

Sulphur dioxide concentration on Deepawali day-2011 increased at four locations, decreased at three locations as compared to Deepawali day 2010. During 2011 it

ranged between 11 and 40 µg/m^3 as compared to 8 and 51 µg/m^3 during year 2010. SO_2 levels were found within the prescribed air quality standard of 80 µg/m^3 at all the locations.

Nitrogen dioxide concentrations on Deepawali day - 2011 were less at six locations and no change was observed at one as compared to Deepawali 2010. NO_2 values ranged between 27 and 56 µg/m^3 as compared to 34 and 72 µg/m^3 during the year 2010. The NO_2 levels were within the prescribed air quality standard of 80 µg/m^3 at all the locations.

Particulate Matter (PM_{10}) levels have shown decreasing trend at all the locations on Deepawali day, 2011 as compared to 2010. RSPM values ranged between 416 and 635 µg/m^3 as compared to 704 and 1350 µg/m^3 during Deepawali, 2010. Lower concentration may be attributed to better dispersion of pollutants with following favourable meteorological conditions:

- Increased 24 hourly average temperatures 26.4°C on October 26, 2011 from 21.2°C on November 05, 2010.
- Increased night time mixing height to 255 metre on October 26, 2011 from 151 metre on November 05, 2010.
- Increased wind speed to 1.1 m/sec. in 2011 from 0.9 m/sec during year 2010.
- Decreased humidity profile to 39% on October 26, 2011 as compared to 75% on Deepawali day November 05, 2010.

Table-5.21 : Ambient Noise Level at different places in Delhi during Normal & Deepawali days in the year 2010 and 2011

S. No.	Location	Average Noise Level in dB (A) Leq.				
		Normal Day (Pre- Deepawali)		Deepawali Day		Max. Prescribed Limit
		Year 2010	Year 2011	Year 2010	Year 2011	
01.	Lajpat Nagar (R)	63	67	76	81	55
02.	East Arjun Nagar (R)	NM	57	NM	74	
03.	Mayur Vihar Phase – II (R)	63	79	85	91	
04.	Pitam Pura (R)	58	58	71	75	
05.	Kamla Nagar (R)	56	58	81	81	
06.	Dilshad Garden (R)	56	56	83	80	
07.	Ansari Nagar (R)	58	56	81	76	
08.	Connaught Place (C)	62	64	71	69	65
09.	I.T.O (C)	65	72	71	71	
Deepawali Day 2010 – 05 November (Friday) Normal day: 19th October 2011. Deepawali Day 2011 – 26 October (Wednesday) Monitoring time: 1800 hours to 2400 hours R – Residential, C – Commercial, NM=Not monitored						

Table-5.22 Ambient Air Quality at Various Locations (NAMP) in Delhi during Deepawali days in the year 2010 & 2011

S. No.		Normal Day (Pre-Deepawali)						Deepawali Day					
	Parameter→	SO_2		NO_2		PM_{10}		SO_2		NO_2		PM_{10}	
	Year→	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
1.	B.S.Z Marg (ITO)	5	13	76	78	236	208	18	28	56	56	1303	416
2.	Pitampura (R)	4	7	46	34	229	184	23	22	44	27	1350	428
3.	Sirifort (R)	4	10	45	75	257	292	14	25	51	30	1012	635
4.	Janakpuri (R)	4	4	55	52	284	323	51	40	43	31	1100	441
5.	Nizamuddin (R)	4	4	43	46	211	220	8	21	54	46	704	421
6.	Shahazada Bagh (I)	5	6	34	58	357	301	28	35	72	45	1116	438
7.	Shahdara (I)	5	6	31	59	375	486	14	11	34	28	1317	497
Concentration Range for Delhi (above stations)		*4-5*	*4-13*	*31-76*	*34-78*	*211-375*	*184-486*	*8-51*	*11-40*	*34-72*	*27-56*	*704-1350*	*416-635*
Ambient Air quality Standards (24 Hrs.)		***80***		***80***		***100***		***80***		***80***		***100***	
All values are in microgram per cubic metre **Deepawali Day 2010: Nov.05,2010 (Friday); Deepawali Day 2011: Oct.26, 2011 (Wednesday)**													

Table-5.23 Ambient Air Quality (gaseous) at Various Locations (CAAQMS) in Delhi during normal day and Deepawali day in year 2011

S. No.		Normal Day (Pre-Deepawali Day)			Deepawali Day		
	Parameter→	SO_2	NO_2	CO	SO_2	NO_2	CO
01.	B.S.Z Marg (ITO)	-	-	2406	-	-	1728
02.	DCE	NM	NM	788	NM	NM	647
03.	Dilshad Garden	24	74	1705	21	68	1556
04.	Shadipur	29	55	2058	22	40	1273
05.	Dwarka	6	28	1108	4	19	964
06.	RKPuram	4	82	NM	40	-	NM
07.	Mandir Marg	6	45	NM	38	74	NM
08.	Punjabi Bagh	10	54	1924	35	73	1023
09.	East Arjun Nagar	30	61	NM	29	45	NM
10.	Civil Lines	22	84	2740	43	60	2050
11.	Airport	20	96	2040	39	64	1730
Concentration Range for Delhi (above stations)		4-30	28-96	788-2740	4-43	19-74	647-2050
Ambient Air quality Standards		*80*	*80*	*2000*	*80*	*80*	*2000*
All Values are in microgram per cubic metre **Deepawali Day 2010: Nov.05,2010 (Friday); Pre-Deepawali Day 2011: Oct 19, 2011 (Wed); Deepawali Day 2011: Oct.26, 2011 (Wednesday) NM=Parameter not monitored**							

Table-5.24 Ambient Air Quality (Particulate Matter) at Various Locations (CAAQMS) during Deepawali 2011

S. No.		Normal Day (Pre-Deepawali Day)		Deepawali Day	
	Parameter→	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
01.	B.S.Z Marg (ITO)	NM	307	NM	291
02.	DCE	NM	NM	NM	NM
03.	Dilshad Garden	254	NM	NM	NM
04.	Shadipur	372	NM	NM	NM
05.	Dwarka	255	NM	NM	NM
06.	RKPuram	439	141	427	220
07.	Mandir Marg	303	163	385	232
08.	Punjabi Bagh	394	188	386	162
09.	East Arjun Nagar	NM	NM	NM	NM
10.	Civil Lines	239	NM	NM	NM
11.	Airport	362	NM	NM	NM
Concentration Range for Delhi (above stations)		239-439	141-307	385-427	162-291
Ambient Air quality Standards		***100***	***60***	***100***	***60***
All Values are in microgram per cubic metre Deepawali Day 2010: Nov.05,2010 (Friday); Pre-Deepawali: Oct 19, 2001 (Wednesday); Deepawali: Oct.26, 2011 (Wednesday) **NM=Parameter not monitored**					

Table-5.25 Meteorological Data Normal Day & Deepawali day, 2011

Parameters	Normal Day (October 19, 2011)			Deepawali Day (October 26, 2011)		
	24 hourly Mean	Max*	Min*	24 hourly Mean	Max*	Min*
Mixing Height (Mtrs.)	604	1664	150	547	1494	170
Wind speed(m/s)	0.5	1.8	0.01	1.1	1.9	0.4
Prevailing Wind Direction	W,WNW	% of Calm: 47.8		W	% of Calm: Nil	
Temperature (°C)	28.1	34.2	23	26.4	31.3	21.7
Relative Humidity (%)	41	54	19	39	54	28
*** Hourly Averages**						

Agra:

Central Pollution Control Board, Project office Agra carried out monitoring of Ambient Air Quality on Pre Deepawali (25th October 2011), Deepawali day (October 26, 2011) and Post Deepawali (27th October 2011) at two monitoring stations, namely Etmad-ud-daulah & Tajmahal. The findings are as below:

Sulphur dioxide concentration on Deepawali day (25th October 2011) was found elevated at Etmad-ud-daulah when compared with the value determined during the Deepawali day of year 2010 (BDL). During Deepawali day of year 2011, SO_2 level was found 8 µg/m3, which was within the prescribed standard of 80 µg/m^3.

Nitrogen dioxide concentration on Deepawali day (25th October 2011) was found lower at Etmad-ud-daulah location when compared with the value determined during the Deepawali day of year 2010 (44 µg/m^3). During Deepawali day of year 2011, NO_2 level was found as 36 µg/m^3, which was within the prescribed standard of 80 µg/m^3.

Particulate Matter PM_{10} level was found lower at Etmad-ud-daulah monitoring location on Deepawali day, 2011 when compared with the level during Deepawali day 2010 (530 µg/m^3). RSPM values (359 µg/m^3) during Deepawali day, 2011 was found above the ambient air quality standard.

Bhopal:

The Central Pollution Control Board, Zonal Office (Central), Bhopal conducted Ambient Air & Noise level monitoring at two locations in Bhopal city during Diwali festival in the year 2011 (October 24 & 26-27, 2011).

All the three monitoring locations (Nehru Nagar, TT Nagar & Chhola Road) are residential and were also monitored during Deepawali Day of year 2010.

Table 5.26 Ambient Air Quality data during Pre-, Deepawali & Post- Deepawali during year 2010 and 2011

Locations	Parameters	Normal Day 2011		Deepawali 2010		Deepawali 2011		Remarks
		Min.	Max	Min	Max	Min	Max	
T.T. Nagar	RSPM (PM_{10})	165	248	74	387	195	592	The weather was found clear
	SO_2	BDL	09	BDL	12	07	23	
	NO_2	14	49	10	46	23	83	
Chhola Road	RSPM(PM_{10})	171	276	107	493	238	741	
	SO_2	BDL	10	BDL	12	BDL	18	

Locations	Parameters	Normal Day 2011		Deepawali 2010		Deepawali 2011		Remarks
		Min.	Max	Min	Max	Min	Max	
	NO_2	23	62	17	48	30	92	
Nehru Nagar	RSPM(PM_{10})	129	167	94	993	212	668	
	SO_2	BDL	09	BDL	11	BDL	13	
	NO_2	20	52	10	63	23	80	

RSPM & Nitrogen Dioxide in ambient air quality monitored during Deepawali 2011 were found to be significantly higher as compared monitoring during Deepawali 2010 at TT Nagar & Chhola road. However, RSPM level at Nehru nagar decreased significantly. Increase in Sulphur Dioxide was observed at most of the locations due to increase in bursting of crackers as well as prevailing cold temperature conditions. RSPM increased significantly at all locations especially on Deepawali day.

Table 5.27 Noise level monitoring results at two locations (TT Nagar & Nehru Nagar) in Bhopal

Locations		Pre- Deepawali (02.11.2010) & (24.10.2011)			Deepawali (05.11.2010) & (26.10.2011)			Post- Deepawali (06.11.2010) & (27.10.2011)		
		Min.	Max.	Leq	Min.	Max.	Leq	Min.	Max.	Leq
T.T. Nagar	2010	61.3	76.5	63.6	62.4	101.7	81.5	52.3	91.5	66.2
	2011	52.0	92.5	67.5	61.0	106.1	78.5	51.9	92.3	74.9
Nehru Nagar	2010	41.7	84.9	58.2	47.3	97.5	70.4	47.2	91.7	62.2
	2011	42.7	91.7	67.4	51.1	117.0	80.2	45.8	100.1	67.6

The maximum noise level **117.0 dB (A)** was observed at Nehru nagar, which exceeded the prescribed limit **45 dB (A)** due to bursting of heavy crackers along with use of musical instruments (Dhol-Nagada & Loudspeakers).

Kolkata:

Central Pollution Control Board, Zonal Office, Kolkata conducted monitoring of PM_{10}, SO_2 and NO_2 in ambient air at Kolkata during Pre-Deepawali, Deepawali and Post Deepawali day at Five sampling locations viz. Behala, Cossipur, Tollygunge, Kasba and Salt lake.

The analytical results indicate that ambient air concentration of RSPM particularly at evening (2 to 10 pm) and night (10 pm to 6 am) observed during pre-Deepawali sharply increased on Deepawali Day at all the locations suggesting strong

influence of human activities. The influence of bursting of crackers on ambient air was sharp increase of SO_2 and NO_2 concentrations during Deepawali. Highest concentrations of PM_{10}, and SO_2 were recorded at Kasba during evening (744µg/m^3 and 75µg/m^3 respectively). The highest NO_2 concentration (206 µg/m^3) was recorded at Cossipore. High PM_{10} concentration may be attributed to gathering of people on unpaved road, movement of vehicles, meteorological factors and bursting of crackers.

The meteorological factors had strong influence on ambient air quality because in few areas, PM_{10} concentrations were apparently high during post-Deepawali day as compared to pre-Deepawali days. But sharp increase of SO_2 and moderate increase of NO_2 clearly indicated strong influence of bursting of crackers. The magnitude of influence was not consistent over study area because increment of PM_{10} and NO_2 observed in Tollygunge and Kasba area continued to post-Deepawali day. In these areas, no bursting of crackers was noted since there was no *mandap* for celebrating Deepawali. The distribution pattern of air pollutants clearly indicated that high concentration of PM_{10}, NO_2 and SO_2 prevails near to festival areas.

5.7.2 Assessment of ambient air quality at Kasba, Kolkata

The ambient air quality monitoring was carried out at Kasba in Kolkata to provide data air quality for national telecast. The daily air quality data collected was statistically processed.

Annual mean and median values of PM_{10} (125 and 109 µg/m^3), SO_2 (6.0 and 5.0 µg/m^3) and NO_2 (23.5 and 19 µg/m^3) indicated that concentration of SO_2 and NO_2 were 32µg/m^3 and 68µg/m^3 respectively which were far below the permissible Air Quality Standard limit. Violation of permissible limit was found for PM_{10} skweness value for RSPM indicates that distribution over the year is symmetric. The linear model of ANOVA reveals no significant variation among the shifts. However significant variation due to month was observed. It has been found that human activities during 24 hours do not influence much changes in concentrations observed in three shifts. The higher relative frequency of PM_{10} concentration (24-hourly basis) over the days (N-206) in a year clearly indicates high level exposure of city dwellers to PM_{10} during the month of November to January.

5.7.3 Monitoring of VOCs at Traffic Intersection of different towns and coke oven industries

VOCs have many harmful effects to human health even at lower concentrations, affecting central nervous systems, respiratory system, liver, kidney, reproductive systems etc. Among the VOCs, benzene has been identified as human carcinogen both by International Agency on Research on Cancer (IARC) and American Conference of Governmental Industrial Hygienist (ACGIH). Volatile organic compounds (VOCs) are omnipresent in lower urban atmosphere because of vehicular, industrial and commercial activities prevailing in urban areas. The coke oven and sinter plants of integrated iron & steel industries are the potential source of VOC.

Central Pollution Control Board, Zonal office, Kolkata under taken the project using low flow sampler for 24 Hrs to assess the level of VOCs at traffic intersection of Kolkata. Accordingly Samples for VOC analyze have been collected at Kolkata, Durgapur, Asansol, Haldia in West Bengal and Talcher-Angul area of Odisha including Coke-Oven section of a Steel Plant. The mean values of Benzene, Tolune and Xylene were 5.3 µg/m^3, 62.4 µg/m^3 and 1.6 µg/m^3 respectively in Kolkata, 3.3 µg/m^3, 67.4 µg/m^3 and 0.65 µg/m^3 respectively in Haldia, 4.3 µg/m^3, 68.5 µg/m^3, 0.68 µg/m^3 respectively in Asansol and 7.2 µg/m^3, 47.5 µg/m^3 and 5.65 µg/m^3 respectively in Durgapur. The towns, highest levels of Benzene (above permissible limit) were registered in Kolkata and Durgapur which were located in heavy traffic street. In Asansol, the concentrations level did not exceed the permissible limit but it is close to the level observed in Kolkata. The study clearly indicated the predominance of tolune among all the VOC investigated.

In coke oven area, benzene, zylene and toluene concentrations were remarkably high. The concentrations Benzene, Zylene and Toluene were significantly higher in vicinity of coke oven plant than traffic intersection in urban areas.

5.8 CONTINUOUS AMBIENT AIR QUALITY MONITORING PROGRAMME

The 16 continuous ambient air quality monitoring stations and its network comprising 16 stations have been established under private participation project in the country, 6 monitoring stations are being operated at Bangalore (BTM Layout, Kadabeshnahalli - BWSSB & Pennya) and Chennai (Alandur, IITM, Manali). These monitoring stations are equipped with various air quality analyzers to measure fifteen air pollutants and seven meteorological parameters. The data generated by these monitoring stations are linked with local and central networking stations apart from dissemination online through digital display board to public.

The data generated at all 6 air quality monitoring stations for the year 2011 has been collected, validated and processed. The data generated at Bangalore and Chennai during year 2011 reveals that the gaseous pollutants (SO_2, NO_2, CO, Ozone & Ammonia) were recorded well within the 24 hourly (80 µg/m^3) National Ambient Air Quality Standard on most days with few exception.

The air quality data of repairable particulate matter (PM_{10}) has been compiled for Bangalore and Chennai are presented in Figure 5.24.

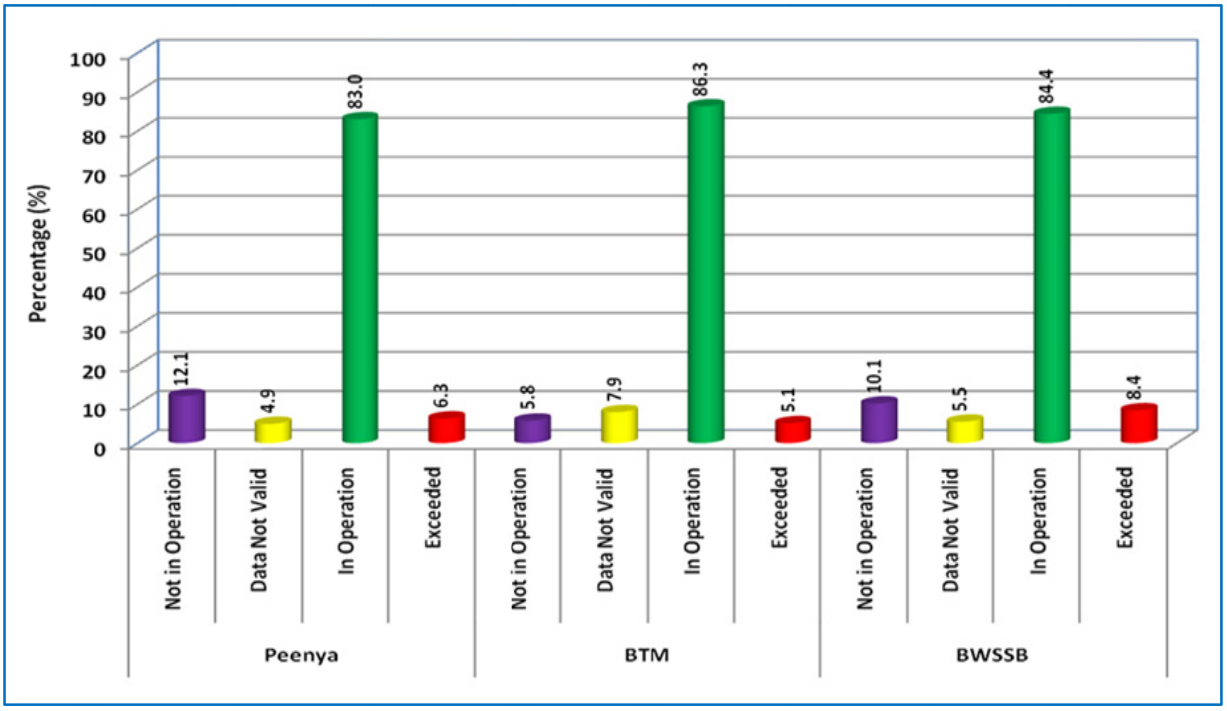


Figure 5.24 : Continuous Ambient Air Quality Monitoring of RSPM (PM10) at Bangalore during year 2011

The monitoring stations at Peenya, BTM & BWSSB in Bangalore were in operation and generated a qualitative data for about 83%, 86.6% & 84.4% of the days in the year 2011 whereas in Chennai the percentage of the days qualitative data generated has been 83.3%,46% & 30.1% in Alandur, IITM & Manali respectively during year 2011.

The data of average 6.1% days in Bangalore and 4.5% days in Chennai has been considered not valid due to several factors which affected the quality of the measurements.

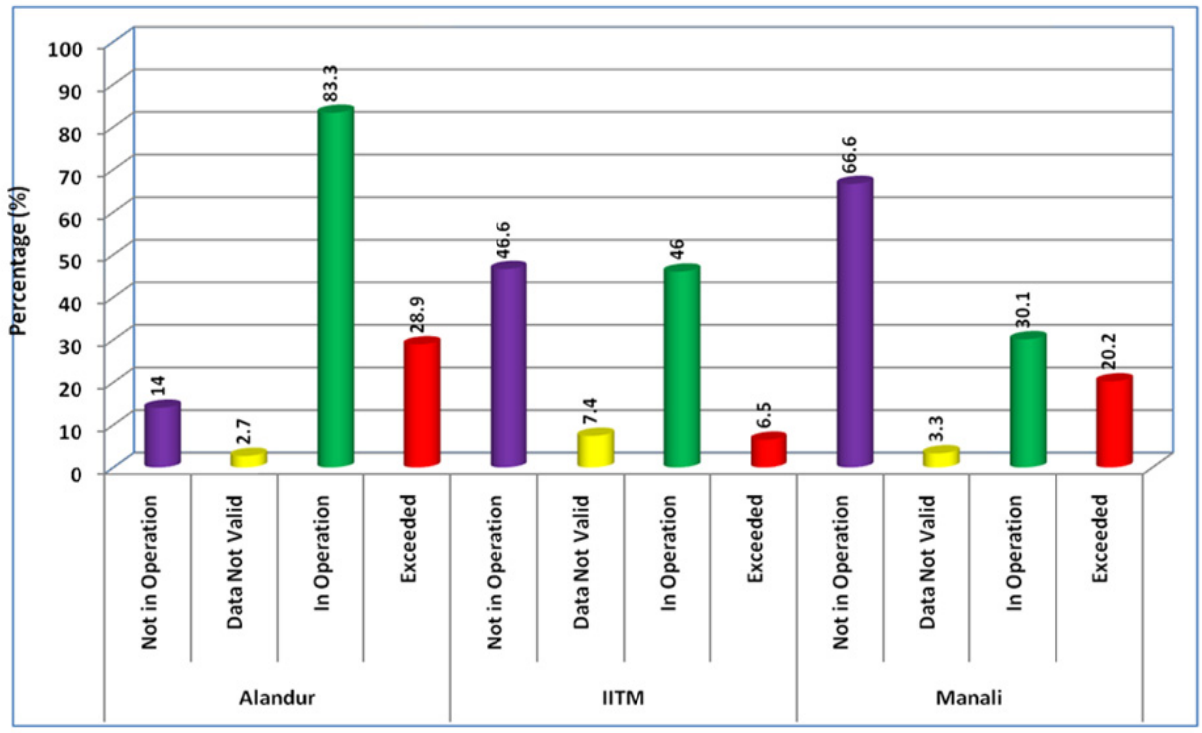


Figure 5.25 : Continuous Ambient Air Quality Monitoring of RSPM (PM10) at Chennai during year 2011

The RSPM data revealed that the concentration was exceeding the 24 hourly standard limit of 100 µg/m^3 during 6.3%, 5.1% & 8.4% of the monitoring days at Peenya, BTM & BWSSB CAAQM respectively in Bangalore whereas in Chennai the same was on 28.9%, 6.5% & 20.2% of the monitoring days at Alandur, IITM & Manali CAAQM respectively.

Meteorological parameters wind speed, wind direction, temperature, humidity; pressure and radiation also measured most of the days at all monitoring stations both in Bangalore and Chennai. The wind rose plotted for both the cities using one hour values of monthly data for the month of January, May and October 2011 to assess wind behavior. The wind rose reveals that the 67.3% of the time predominant wind speed ranging from 1.63 to 2.75 m/s was from east direction in the month of January 2011 at Pennya, 33%, 21.1% of the time the wind speed is ranging from 1.63 to 2.75 m/s, 2.75 to 3.9 m/s respectively from west direction at BTM layout and 28.5% of predominant wind speed was ranging from 0.5 to 1.63 m/s was from south east direction at BWSSB during October 2011 in Bangalore.

Figure 5.26 : Monthly wind rose at Pennya, BTM and BWSSB at Bangalore

The wind rose for the Chennai city reveals that 21.6%, 29.8% of the time the predominant wind speed ranging from 0.5 to 1.63 & 1.63 to 2.75 m/s respectively was from east direction in the month of January 2011 at Alandur, 24.3%, 21.2% of the time the wind speed was ranging from 0.5 to 1.63 m/s was from north and north west direction at IITM and 45.6%, 36.2% of the time, the predominant wind speed was ranging from 1.63 to 2.75 m/s was from south and south west direction at Manali during May 2011 in Chennai.

Figure 5.27 : Monthly wind rose at Alandhur, Manali and IITM at Chennai

5.9 NOISE MONITORING

5.9.1 National Ambient Noise Monitoring Network (NANMN) Programme

Central Pollution Control Board initiated the process of developing National Ambient Noise Monitoring Network (NANMN), a follow-up of Section 5.2.8 (IV) of National Environmental Policy (NEP)-2006 through which it was decided to include ambient noise as a regular parameter for monitoring in specified urban areas.

During year 2010-11, Central Pollution Control Board in association with State Pollution Control Boards has established Real Time National Ambient Noise Monitoring Network by installing 35 Noise Monitoring System in seven metropolitan cities viz. Mumbai, Delhi, Kolkata, Chennai, Bangalore, Lucknow and Hyderabad (five stations in each).

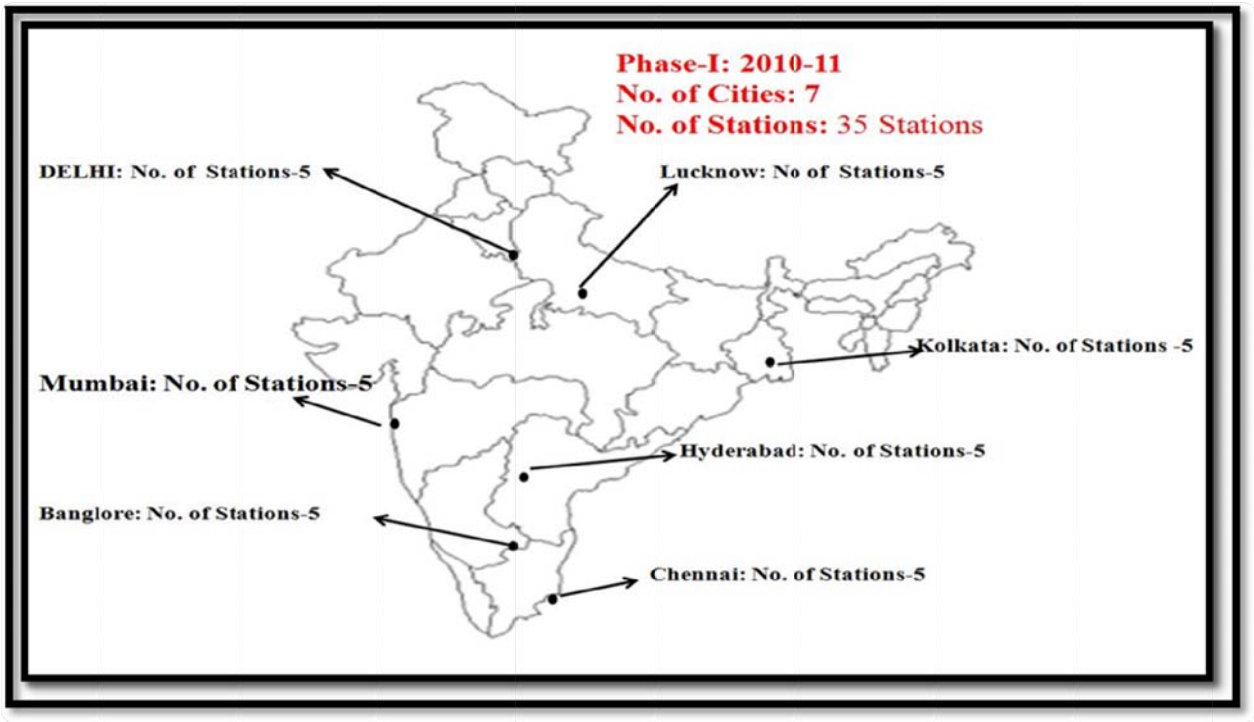


Figure 5.28 : Map showing 35 Noise Monitoring stations installed during Phase-I

This proposed that 35 additional Noise Monitoring stations shall be added 07 metropolitan cities viz. Mumbai, Delhi, Kolkata, Chennai, Bangalore, Lucknow, Hyderabad (five in each) during the year 2012-13 under Part B: Phase-I of the Programme and 90 Noise Monitoring stations proposed to be installed in 18 new cities (5 in each) during implemented year 2013-14 The programme is implemented on 50:50 cost sharing basis with states.

Accordingly consent for cost sharing on 50:50 basis has been received from seven SPCBs/PCC (Andhra Pradesh, Karnataka, Maharashtra, Tamilnadu, UP, West Bengal and Delhi) for procurement /installation of five additional Noise Monitoring System in each of the 7 Cities (Hyderabad, Bangalore, Mumbai, Chennai, Lucknow, Kolkata and Delhi) under Part B: Phase-I Programme. Noise data generated at these Noise Monitoring Stations 7 Metropolitan cities during year 2011 is presented in Tables 5.28 to 5.34.

Table 5.28 : Ambient Noise Level Data of Delh during year 2011

Station	Limit in Leq dB (A)		February		March		April		May		June		July		August		September		October		November		December	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Dilshad Garden(S)	50	40	53.36	49.58	52.61	50.61	51.19	50.02	51.42	50.86	51.69	50.24	52.65	50.52	54.16	54.47	52.37	51.10	52.31	49.68	51.91	49.45	52.21	49.75
CPCB, HQ(C)	65	55	66.08	54.21	65.74	54.47	65.29	54.99	65.11	55.64	60.22	52.71	61.78	52.09	63.05	53.80	63.39	51.72	63.40	51.68	62.46	55.25	61.12	54.23
DCE Bawana(S)	50	40	53.81	49.84	52.82	48.26	51.74	48.80	52.32	50.54	67.09	63.54	53.81	49.84	53.81	49.84	53.94	53.95	51.03	48.82	51.07	47.41	50.87	46.11
ITO (C)	65	55	74.44	72.65	73.16	71.70	72.35	70.19	72.04	69.78	72.73	70.83	73.51	71.39	72.95	70.42	72.95	69.92	73.09	71.01	73.05	70.95	72.95	69.07
NSIT Dwarka(S)	50	40	57.65	54.31	57.27	54.39	56.44	53.88	55.88	53.66	55.49	54.69	55.09	52.22	54.06	52.34	56.01	54.18	57.12	54.48	57.12	54.48	58.62	54.08

Table 5.29 : Ambient Noise Level Data of Lucknow during year 2011

Station	Limit in Leq dB (A)		February		March		April		May		June		July		August		September		October		November		December	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Gomti Nagar (R)	55	45	63.70	54.82	63.12	55.14	62.27	55.42	62.36	56.03	62.83	55.87	72.66	62.88	63.17	51.42	62.16	55.03	61.23	55.67	72.86	61.38	73.14	61.32
Hazrat Ganj (C)	65	55	73.46	63.34	71.43	60.61	71.55	61.53	71.87	62.63	72.28	62.92	60.61	72.24	69.76	60.27	72.45	61.57	72.05	62.69	72.51	61.36	71.31	61.46
Indira Nagar (R)	55	45	53.65	45.44	53.14	47.44	53.56	49.54	54.09	51.66	56.26	51.77	55.98	50.82	54.81	49.68	53.62	47.23	52.89	45.97	53.07	43.73	52.77	44.43
P.G.I Hospital (S)	50	40	53.36	46.07	53.06	46.98	53.75	49.53	54.65	50.30	59.31	53.34	58.54	53.24	53.16	45.07	51.56	47.17	53.06	46.98	52.85	49.73	56.65	50.25
Talkatora Industrial Area (I)	75	70	64.66	56.10	62.44	52.71	62.72	54.25	63.05	58.21	63.15	57.74	64.14	56.99	63.07	55.73	63.48	55.24	62.54	54.65	63.02	54.00	61.12	54.00

Table 5.30 : Ambient Noise Level Data of Kolkata during year 2011

Station	Limit in Leq dB (A)		February		March		April		May		June		July		August		September		October		November		December	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Kasba Gole Park (I)	75	70	62.37	57.84	61.47	57.07	62.35	57.96	63.73	59.29	65.50	61.11	63.76	59.53	64.18	59.55	64.51	60.83	63.59	60.54	63.98	60.00	62.18	59.99
New Market (C)	65	55	67.40	58.32	67.04	59.95	67.10	60.62	67.34	61.32	67.35	61.35	67.33	60.32	68.11	61.18	68.26	59.82	67.14	59.69	66.24	58.14	67.04	57.22
Patauli(R)	55	45	54.88	46.73	55.16	47.34	55.46	49.54	55.04	50.05	56.33	50.03	55.70	51.58	56.15	50.04	55.26	50.58	55.26	50.58	53.47	45.91	52.97	46.52
SSKM Hospital(S)	50	40	61.95	54.51	62.12	55.14	61.27	55.37	61.24	54.90	61.34	54.46	61.47	54.35	60.98	53.64	61.55	53.99	60.67	54.44	60.97	53.41	61.17	52.24
WBPCB, HQ (C)	65	55	63.24	57.50	62.01	56.09	61.89	56.37	61.79	56.37	61.84	56.47	61.79	54.21	61.51	54.99	61.73	54.62	61.03	56.28	61.26	54.84	62.16	53.19

Table 5.31 : Ambient Noise Level Data of Mumbai during year 2011

Station	Limit in Leq dB (A)		February		March		April		May		June		July		August		September		October		November		December	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
AS HP (S)	50	40	68.86	57.26	68.22	57.16	66.84	58.63	64.82	58.97	65.81	59.08	66.01	59.38	65.75	59.92	66.13	61.55	65.00	60.13	65.96	61.56	66.16	60.76
Bandra (C)	65	55	70.43	69.22	69.92	67.96	69.61	67.77	69.77	67.44	70.15	66.77	69.54	66.48	70.64	67.43	69.06	66.57	69.05	66.87	69.32	67.50	70.12	66.41
MPCB, HQ (C)	65	55	66.78	63.73	66.14	63.29	66.51	62.48	66.65	62.24	67.70	62.75	67.28	62.51	66.84	62.56	66.59	63.02	65.79	62.87	65.79	62.87	66.89	62.17
Thane MCO (C)	65	55	61.10	50.46	61.26	51.09	60.73	53.15	63.21	55.75	64.98	57.96	64.41	55.31	63.99	56.10	62.81	56.27	61.97	55.40	60.96	53.26	59.16	54.36
Vashi Hospital (S)	50	40	65.93	60.42	65.56	60.52	66.76	58.90	69.46	70.27	69.36	57.87	69.67	58.05	69.12	58.12	69.56	57.97	68.78	58.33	67.55	57.26	65.35	56.16

Table 5.32 : Ambient Noise Level Data of Hyderabad during year 2011

Station	Limit in Leq dB (A)		February		March		April		May		June		July		August		September		October		November		December	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Abids(C)	65	55	72.05	62.99	71.77	62.35	71.93	62.87	72.16	64.34	83.30	74.82	72.26	63.29	73.13	65.35	72.20	63.97	72.46	63.08	73.12	62.86	71.45	62.86
Jeedimetl (I)	75	70	62.86	57.21	62.05	55.79	62.16	56.95	61.87	55.94	61.76	54.95	62.10	53.93	62.43	53.88	62.94	55.92	62.43	57.69	62.81	57.87	61.21	56.12
Jubilee	55	45	57.15	49.44	58.25	52.20	58.19	52.04	55.85	48.72	56.55	50.24	58.63	50.91	58.63	50.91	83.03	48.51	65.68	52.52	57.05	49.56	56.15	47.26

Station	Limit in Leq dB (A)		February		March		April		May		June		July		August		September		October		November		December	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Hills (R)																								
Punjagutti (C)	65	55	75.79	71.34	75.62	71.33	75.72	71.45	75.25	71.26	76.66	73.24	77.27	72.20	76.24	71.24	76.24	71.24	75.36	70.54	75.36	70.54	76.46	69.14
Zoo Park (S)	50	40	53.22	47.71	53.13	47.96	53.16	47.60	52.99	47.91	53.16	47.60	52.59	48.91	54.90	50.02	55.50	55.36	56.50	54.67	51.81	48.29	52.11	48.01

Table 5.33 : Ambient Noise Level Data of Bangalore during year 2011

Station	Limit in Leq dB (A)		February		March		April		May		June		July		August		September		October		November		December	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
BTM (R)	55	45	66.34	55.76	66.21	57.66	66.06	57.22	66.18	55.60	66.72	56.56	66.84	57.41	66.91	58.67	66.44	55.76	65.86	55.53	65.66	55.62	66.5	57.94
Marathhali (C)	65	55	55.64	52.48	56.54	51.82	56.27	52.23	56.75	52.98	59.42	54.01	59.77	55.99	57.88	57.84	55.09	54.39	54.00	52.58	54.81	53.07	54.9	52.78
Nisarga Bhawan (R)	55	45	63.54	51.32	53.10	45.89	53.99	47.06	56.13	48.30	60.18	51.26	58.86	48.09	58.02	48.02	57.08	48.38	55.21	46.61	55.17	47.38	55.4	46.35
Parisar Bhawan (c)	65	55	65.49	58.11	64.84	57.58	65.31	58.17	65.11	58.28	67.91	57.26	67.77	57.44	66.15	57.50	65.66	57.38	66.78	59.35	67.74	58.95	66.9	59.05
Peenya (I)	75	70	57.77	58.61	55.93	54.87	54.03	50.96	54.57	52.18	54.03	50.96	56.83	53.47	59.38	55.27	56.54	56.17	55.57	56.37	57.35	76.23	56	49.11

Table 5.34 : Ambient Noise Level Data of Chennai during year 2011

Station	Limit in Leq dB (A)		February		March		April		May		June		July		August		September		October		November		December	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Eye Hospital (S)	50	40	64.65	50.24	63.82	50.89	64.59	51.79	64.27	53.38	64.45	52.74	63.88	52.65	63.50	52.95	63.36	52.15	63.74	50.51	62.91	50.15	63.91	51.45
Guindy (I)	75	70	76.50	72.24	77.17	73.89	76.22	71.45	76.23	71.79	76.27	71.92	76.13	72.00	76.01	71.57	75.99	71.62	75.99	72.14	74.90	70.39	75.45	69.33
Perambur (C)	65	55	67.36	58.18	67.72	57.39	68.13	58.21	67.88	59.69	68.02	59.24	68.07	59.79	68.07	59.79	68.04	59.38	68.60	58.44	69.44	59.66	70.55	59.35
T Nagar (C)	65	55	72.61	61.32	72.14	61.03	72.13	60.85	72.23	62.89	72.93	63.74	73.02	62.34	72.90	62.59	72.94	62.07	73.51	61.72	73.29	60.95	72.19	60.20
Triplicane (R)	55	45	42.75	46.01	43.08	46.59	55.12	48.17	67.02	56.35	68.10	57.33	67.44	56.29	67.69	57.38	67.85	56.05	68.28	55.43	67.76	54.66	68.16	55.26

Remarks: All values are measured in dB(A) Leq; Day time: 6 AM to 10 PM; Night time : 10 PM to 6 AM

The metropolitan city wise findings are as below:

Delhi

Noise monitoring station at CPCB- Head Office indicated sound level within the prescribed standards. The level sound at ITO stations always exceeded the limit; while remaining four stations also exceeded the prescribed Noise standard.

Lucknow

Sound level at Talkatora Industrial Area was within the prescribed standards whereas Noilse level at Indira Nagar Station exceeded the standard during night time. The sound level at Gomti Nagar, Hajrat Ganj and SGPGI hospital stations exceeded the prescribed standard.

Kolkata

Sound level at Kasba Golpark, WBPCB HQ stations were within the prescribed standards, whereas New market, Patauli, SSKM hospital exceeded the prescribed noise standard.

Mumbai

The sound level at all five stations exceeded the prescribed standards.

Hyderabad

Sound Level at Jeedimetla was within the prescribed limit whereas at remaining four stations exceeded the prescribed standard.

Bangalore

Excedance of noise standards for both day and night time was recorded at BTM layout. Noise values at remaining four stations have been within prescribed noise standard.

Chennai

Sound level at all five locations namely Eye Hospital, Perambur, T. Nagar and Triplicane, Guindy Exceeded the prescribed noise standard.

* * *

CHAPTER VI

PRESENT STATE OF ENVIRONMENT, ENVIRONMENTAL PROBLEMS AND COUNTER MEASURES

6.1 STATUS OF AIR POLLUTION CONTROL IN MINI CEMENT PLANTS

Vertical Shaft kiln (VSK) technology based mini cement plants are popular in small limestone deposits areas due to requirement of less capital investment and less land area (1 hectare) requirement. In Rajasthan and Madhya Pradesh 64 and 12 mini cement plants have been established. CPCB Zonal Office, Bhopal visited mini cement plants in Rajasthan and Madhya Pradesh in three phases between September 2011 to February 2012 to investigate & measure the status of air pollution control. The findings during these visits are as below:

- About 90% of plants were found not in operation during the visits probably due to less demand and competition with large cement units.
- Majority of plants are having kilns of 50 TPD capacity. Most of the plants manufacture OPC & PPC of Grade 43 & 53. Few units were doing only job work of grinding & packaging using clinker from large cement units.
- Only few units have installed wet scrubbers and bag filters for kiln emission control. None of the units has interlocked system for process equipments and emission control devices. None of the units has proper fugitive emission control arrangements at crushing, milling & packaging area, only exhaust fans are provided. Overall housekeeping in these units is also poor.
- Stack emissions monitoring was carried out in three mini cement plants and Particulate Matter emission between 141 mg/Nm^3 to 232 mg/Nm^3 (prescribed limit of PM is 250 mg/Nm^3), SO_2 emission between 2.61 mg/Nm^3 to 8.11 mg/Nm^3 and NO_2 emission between 307 mg/Nm^3 to 429 mg/Nm^3 were observed.
- Fugitive emissions were also monitored in three mini cement plants and SPM concentrations were found 11994 µg/m^3 at lime stone crusher area, 2543 mg/m^3 raw mill area, 2496 mg/m^3 at vertical shaft kiln area, 2263 µg/m^3 at clinker yard area, 2748 µg/m^3 at cement mill area, and 1685 µg/m^3 packaging plant area. Noise level in the plant in day time were recorded between 64.4 to 80.1 dB (A).
- Ambient Air Quality monitoring shows that NOx level was ranging between 9 µg/m^3 to 47 µg/m^3, RSPM values between 31µg/m^3 to 82µg/m^3.

It is derived that the mini cement plants having capacity less than or equal to 50 TPD are not taking interest in installation of adequately designed air pollution control equipments due to financial reasons. These units should necessarily install source emission control equipment, interlocked with process machinery and with separate energy meter to record electricity consumption in operation of emission control equipment, and fugitive emission control system such as dust suppression/extraction systems, close conveyer systems should be installed for material transfer and telescopic chutes at dumping/loading area to control the fugitive emissions. Occupational safety provisions should be adopted by all units to reduce the risk of health of workers.

6.2 DISPOSAL OPTIONS OF MARBLE SLURRY IN RAJASTHAN

Rajasthan is the prominent state with regards to marble deposits both in quality and quantity (1100 Million Tons). Around 4000 marble mines and 1100 marble processing units, are spread over 16 districts out of 33 districts of Rajasthan. Important regions of marble deposits are Udaipur - Rajsamand - Chittorgarh region, Makrana - Kishangarh region, Banswara - Dungarpur region, Andhi (Jaipur) - Jhiri (Alwar) region and Jaisalmer region.

Rajasthan also has more than 95% of marble processors of the country. Important processing centers in the state are Makrana, Kishangarh, Rajsamand, Alwar, Udaipur, Nathdwara and Abu Road. The marble slurry generated in processing units in generally dumped at any abandoned land and near roadsides at Chittorgarh, Nimbahera, Neemuch & Shahpura (Alwar) areas. Due to Government orders on control of environmental pollution and also due to public awareness, these activities have now reduced. The local Marble Associations have identified disposal sites and marble slurry is being disposed through tankers at identified sites.

About 1100 marble processing units all over the Rajasthan generate about 5-6 million tonne marble slurry every year. To access the options to manage this huge inorganic and non-hazardous waste in gainful / productive use, a preliminary survey was conducted by Central Pollution Control Board during 13th January to 23rd January, 2012 at Kishangarh, Rajsamand, Makrana, Udaipur and Chittorgarh regions of Rajasthan and after preliminary survey an interaction meet on 'Marble & Marble Slurry Disposal: Problems, Issues & Solutions' was organized at Kishangarh (Rajasthan) on 28th February, 2012 along with representatives of Marble Associations, Cement industries and marble processing units. Various

stages/options of utilization of marble slurry have been identified and suggested as below:

- Utilization of marble slurry in cement manufacturing
- Production of synthetic gypsum through chemical reaction with marble slurry
- Utilization of marble slurry as a low cost binder
- Utilization of marble slurry in brick manufacturing
- Utilization of marble slurry powder in road construction
- Utilization of marble slurry powder in mineral grinding plants

The feasibility of above options are proposed to be examined in detail in consultation with the various organization/institutes/industries like cement manufacturer, NCBM, CRRI, CDOS etc to evaluate most techno-economical and viable solution/option marble of slurry disposal.

6.3 STUDY OF IMPORTANT WATER BODIES IN CENTRAL ZONE

Bhopal city, the capital of Madhya Pradesh, is endowed with several ancient man-made lakes created centuries back in past. The Upper Lake, created in 11th century AD, and Lower Lake, created in the late 18th century AD. Upper lake is of has special significance since it has been a source of piped water supply to the city of Bhopal for over 75 years. Even now, the lake water accounts for about 40% of the city's water supply. Until 1947 the water quality of Upper Lake was so good that it required no treatment before being supplied to the public. The lake has immense importance linked with the socio, economical and cultural aspects of the people of Bhopal and is referred to as lifeline of the city. However, tremendous population growth of the city (from 70,000 in the year 1951 to 19 million in year 2011), rapid urban development and northern fringes of Upper Lake subjected to various environmental problems, deterioration of their water quality mainly due to inflow of untreated sewage.

The Upper Lake has both rural and urban catchments. In the last few decades of the 20th century, many sections of this lake became surrounded by habitations and recreational activities have been developed. These developments creating anthropogenic pressures on the lake accelerating its eutrophication and microbial contamination. Disposal of idols, Tazias and motor boat recreational activities contributing contamination of lake water. These are plans to bring Narmada river water for domestic water supply in Bhopal which may provide improvement in lake water quality as water withdrawal will be reduced and assimilation capacity enhanced.

Table 6.1 : Water Storage and Supply from Upper Lake, for Bhopal city

Year	Water Level (ft)	Quantity of water (MCFT)	Daily supply (MGD)
2009	1648	214	06
2010	1658	1274	12
2011	1651	481	15
2012	1657	1192	25

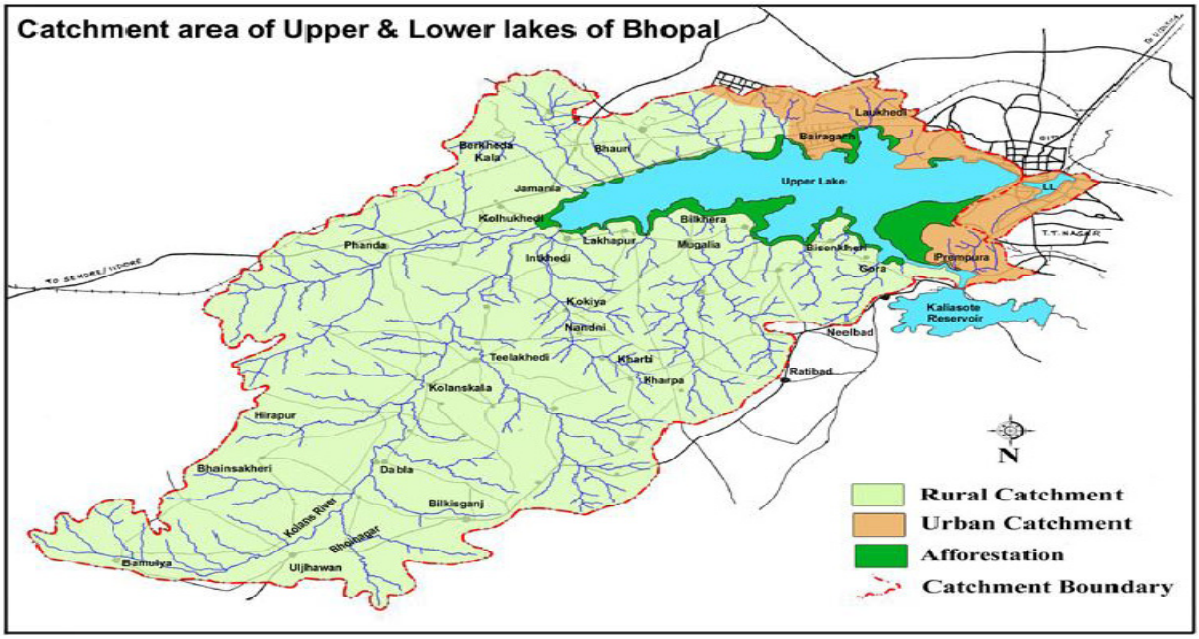


Figure 6.1: Catchment area of Upper & Lower lakes of Bhopal

Central Pollution Control Board has undertaken study on water quality of the lake with special reference of Polyaromatic Hydrocarbons (PAH). Water sediment samples were collected from 61 locations and analysed for general parameters, heavy metals and PAHs in water and sediment samples of upper lake. EPA's 16 priority PAH namely naphthalene, acenaphthalene, acenaphthylene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benz (a) anthracene, chrysene, benzo (b) fluranthene, benzo (k) fluoranthene, benzo (a) pyrene, dibenzo (a,h) anthracene, indeno (1,2,3-cd) pyrene and benzo (ghi) perylene have also been analyzed.

Collected water samples: Most of the water quality parameters were found within water quality limit. Maximum DO concentration observed evening time while minimum in early morning hours. PAH (Acenaphthalene) was found in water collected from all sampling points. Ni, Cu & Zn were observed in sediments ranging between 35-77 mg/kg.

Table 6.2: Upper Lake Monitoring at Bhopal during year 2011-12 (Average Values)

Water Samples (TC/FC per 100 ml, PAH in µg/l Other parameters, except pH, Cond, Temp, in mg/l)						
Locations/Parameters	**R-1**	**R-2**	**T-1**	**T-2**	**T-3**	**I**
pH	8.03	8.10	7.97	7.99	8.00	8.08
Conductivity	229	233	231	234	231	234
Water Temperature °C	21	21	21	22	21.63	22
Total Solid	88	82	89	90	83	82
COD	08	07	07	07	06	09
BOD	2.5	2.5	2.4	2.6	2.4	3.6
NH_3-N	0.11	0.15	0.15	0.11	0.14	0.17
NO_3-N	NT	NT	NT	NT	NT	NT
NO_2-N	NT	NT	NT	NT	NT	NT
PO_4-P	0.042	0.047	0.045	0.041	0.041	0.054
Sodium	10.2	10.2	10.4	10.4	10.2	10.2
Potassium	4.5	4.0	4.0	4.3	4.0	4.0
Chloride	17	18	19	18	20	20
Sulphate	06	06	6.2	5.9	6.2	6.5
Fluoride	0.01	0.01	0.01	0.011	0.011	0.019
Alkalinity	69	71	71	67	69	70
Total Coliform	563	487	627	627	483	580
Fecal Coliform	183	197	167	193	197	173
Acenaphthalene	11.29	16.22	14.35	15.71	7.46	11.96
Benzo (b) Fluranthene	ND	ND	ND	ND	0.15	ND
Benzo (a) Pyrene	ND	2.05	ND	ND	ND	0.18
Sediment Samples (mg/kg) on dry weight basis						
Nickel	41.6	54.0	48.55	52.75	52.95	35.15
Copper	57.55	77.60	71.75	74.90	74.80	48.70
Zinc	48.20	62.00	57.10	58.40	65.90	48.50

Remarks (R- Reference, T- Trend & I-Impact point)

6.4 ASSESSMENT OF POLLUTION LOAD IN BUDHA NALA, LUDHIANA PUNJAB

Central Pollution Control Board, Lucknow has undertaken study to assess pollution load generated from the Ludhiana city and meeting river Satluj. Salient findings of the study are presented ahead:

a. Budha Nala is a major drain in Ludhiana carrying industrial and sewage from the city. It is a seasonal water stream, which runs through Malwa region of Punjab.
b. City of Ludhiana and Machhiwara are situated to the south of the Buddha Nala. Buddha Nala runs parallel to the Satuj on its south for a fairly large

section of its course in the Ludhiana district and ultimately joins Satluj at Gorsian Kadar Baksh in the northwestern corner of the district. It floods during the rainy season, but in the dry season it can be crossed on foot at certain points

c. Budha Nala enters Ludhiana city at Kamkalm Village which is 40 Km away from Chamkorpur Sahib, the origin point of Sutlej Canal. Water is used for irrigation by farmers of nearby Tajpur and Kamkalm villages.
d. Wastewater from different industries & urban area is discharged into the drain near Tazpur village which increases its pollution load. Various drains from different part of the city such as Kasmir Nagar-Shamsan Ghat (283 MLD), Tranport Nagar (Gausala Road) and Singur Cinema areas) carrying wastewater mixed with in Budha Nullah. The drain is heavily polluted due to discharge of industrial effluents from Ludhiana city.
e. During the study, in the Budha Nala Drain stretch passing through the city the wastewater discharge have been found varying from 200 to 800 MLD at different location.

Table 6.3 : Characteristics of wastewater in Budha Nala, Ludhiana

Sampling Points*	Flow (MLD)	Parameter**						
		pH	TSS	S^{-}	PO_4-P	NH_3-N	BOD	COD
1	219	9.2	132	9.40	4.5	3.44	89.5	362
2	281	7.3	94.4	-	6.20	ND	31.0	189
3	377	7.1	361	-	1.8	9.42	96.2	396
4	283	7.1	262	-	0.7	3.24	63	221
5	480	7.17	339	-	1.8	5.16	70	454.0
6	895	7.2	375	-	1.97	4.07	77.5	418.0
7	807	7.19	363	-	10.8	12.38	95	336
8	683	7.33	484	-	18.9	23.65	81.6	502
9	NM	7.21	210	1.2	4.3	ND	5.25	52.3
10	NM	6.91	496	-	4.1	15.81	117.6	732
11	152	7.73	341	-	2.9	15.55	88	358

*** All values are in mg/l except pH and Coliform, The unit of coliform is MPN/ 100 ml; NM=Not Measured*

Sampling Locations:

1 *Budha Nala, up stream of discharge point of Jamalpur STP.*
2 *Budha Nala, downstream of discharge point of Jamalpur STP, near Tejpur Police chowki*
3 *Budha Nala, downstream at G.T Road Jamalpur by pass*
4 *Budha Nala, upstream Kasmeer Nagar Drain confluence at Samsan ghat*
5 *Budha Nala, near Shivling Tower, Vijay nagar*
6 *Budha Nala, near Lord Mahavira Homeopathic College and Hospital*
7 *Budha Nala, downstream of discharge point of Bolloki STP, after mixing of dairy sewage and slaughter house waste water*
8 *Budha Nala, at Ballipur/ Kharbet Village*
9 *Budha Nala, during mixing of River Satluj at Balipur/Maniwal Village.*
10 *Budha Nala, before confluence with R.Satluj*
11 *Out let of Baloki STP.*

6.5 PRESENCE OF HEAVY METALS IN VEGETATION IN VICINITY OF MANDIDEEP INDUSTRIAL AREA

Mandideep industrial area has industries like electro graphite, fabrication (steel & wooden), paints, pesticides formulation, bulk drug & pharmaceuticals, steel & aluminium rolling units, epoxy casting, electrical insulators, battery, food processors, plastics, transformers, detergents, soft drinks, gelatin, thermal power plant, recycled paper, spinning, weaving/dyeing. The industrial effluent generated from Mandideep industrial area finally meets River Betwa. The study was undertaken for assessment of heavy metals (Pb, Cd, Ni, Cu, Zn & Cr) in water, soil and vegetation (grass). Sampling was undertaken in 200-1000 metres vicinity of Mandideep industrial area.

The studied reveals that river Betwa is free from toxic heavy metals (Pb, Cd, Ni, Cu & Cr) contamination however Zn concentration was observed which was below drinking water quality standard *(IS-10500-1991)*. The soil & plant species (*Cynodon dactylon*) in Mandideep industrial area have no excessive presence of Pb, Cd & Cr. However, the presence of heavy metal Ni (2-25mg/kg), Cu (5-35 mg/kg) and Zn (25-45mg/kg) have been found more than the required concentration (less than 10 mmol per kg of dry matter) in grass (*Cynodon dactylon*). It seems that Uptake of these metals (Ni, Cu & Zn) is undertaken by root systems via passive and active transport. Uptake of Cu^{+2}, Ni^{+2} & Zn^{+2} is competitive while, uptake of Zn is higher than Cu & Ni. The higher concentration of Zn in grass may also be attributed due to availability of Zn mineral in soil.

6.6 ENVIRONMENTAL STATUS OF SPONGE IRON INDUSTRIES IN BELLARY, KARNATAKA

Sponge Iron Plant

The clusters of sponge iron industries are located in Bellary and Hospet in Karnataka. Major environmental issues from these industries are air pollution, solid waste disposal and water pollution which lead to poor ambient air quality, contamination of surface and ground water quality and degradation of soil fertility. The study has been undertaken by Central Pollution Control Board to assess the

environmental status of the area and the pollution control measures taken by the industries**.** The findings are as below:

- Out of 7 sponge iron industries, two industries were using pellets as a raw material, 3 industries using iron ore as raw material and 2 industries using 50% iron ore & 50% pellet;
- All units are mainly using South Africa coal which is having less ash content;
- Four industries have installed Waste Heat Recovery Boiler (WHRB) to produce power, 3 units have not yet installed any WHRB;


ESP Installed to Control SPM

Waste Heat recovery boiler

- All units have provided bag filters with stack at iron ore crushing, raw material feeder tank, kiln cooling discharge tank, Intermediate bunk and final product separation;
- Most of the sponge iron units have been units were found keeping open the cap of After-Burning Chamber to bypass the flue gases;
- 2 units were found having stored huge quantity of charcoal and dolochar in their premises, 5 units were found to dispose their charcoal and dolochar to power plants while bag filter dust lifted by cement industry; and
- All units are using bore well water for kiln cooling, and have cooling pond for reuse of hot water for kiln cooling.

By Passing of flue gas


Dolochar and charcoal stored in their premises

6.7 MEASUREMENT OF HAZARDOUS ORGANIC COMPOUNDS DIOXINS (PCDDS) AND FURANS (PCDFS) IN ENVIRONMENTAL SAMPLES

Polychlorinated dibenzo-para-dioxins (PCDDs) and polychlorinated dibenzo-furans (PCDFs) are environmental contaminants usually present in diverse environmental matrices. Out of 75 theoretically possible PCDD congeners and 135 PCDF congeners, 7 PCDD congeners and 10 PCDF congeners are having considerable toxicity. These congeners are monitored as per internationally practiced convention (WHO-TEF) in environmental matrices, which may vary from sub ppt level and may reach up to ppm level. Under this project, development of infrastructure facilities were undertaken and following activities executed during the reporting year.

Monitoring of Dioxin – Furan in Stationary Source Emissions

The monitoring of Dioxin – Furan in stationary source emission at Treatment Storage and Disposal Facilities (TSDFs), Incinerators of organic chemical manufacturing units and Bio-medical waste incinerators were undertaken.

Sinter Plant Stack Emissions Monitoring

Source Emissions Monitoring

Source Emission Dioxin / Furan Monitoring at TSDF Incinerators

Ambient Air Dioxin Monitoring in Critically Polluting Areas (CPAs)

Ambient air dioxin – furan monitoring is being continued by National Reference Trace Organics Laboratory at ten identified Critically Polluting Areas (CPAs) in the country in association with CPCB Zonal Offices at Bangalore, Kolkata and Vadodara.

Table 6.4 : Ten Most critically polluted areas identified for Ambient Dioxin Furan Monitoring

State	Identified Critically Polluted Areas
Punjab	Ludhiana
Uttar Pradesh	Ghaziabad
Haryana	Bhiwadi
Madhya Pradesh	Singrauli
Gujarat	Ankleshwar and Vapi
Maharashtra	Chandrapur
Tamilnadu	Vellore
Chhattisgarh	Korba
Orissa	Angul - Talchar

Vapour phase and particulate phase Dioxin & Furan ambient air sampling has been performed by Polyurethane Foam High Volume Sampler (PUF-HVS) at identified locations within the Critically Polluted Area (CPA) at quarterly intervals.

Vapour phase and particulate phase sampling has been completed for four quarters on most locations. The samples have been analysed by High Resolution Gas Chromatograph with High Resolution Mass Spectrometer (HRGC-HRMS) for 17 congeners of dioxin-furan. The Dioxin / Furan monitoring data is being compiled for assessment of Status of Ambient Dioxin furan at most Critically Polluted Areas.

6.8 VOLATILE ORGANIC COMPOUNDS (VOCs) MEASUREMENT IN DRINKING/SURFACE WATER SAMPLES

Volatile Organic Compounds (VOCs) are carbon-containing compounds that readily evaporate at normal air temperature. Fuel oils, gasoline, industrial solvents, paints, and dyes are the major sources of VOCs. US-EPA lists 68 most common VOCs for environment assessment from the known sources. These 68 VOCs cover a wide range of chemical compounds that have different chemical and physical properties and different levels of toxicity. Chlorinated VOCs are associated with commercial and industrial use and include dozens of chemicals that are typically very mobile, persistent, and toxic in the environment. Non-chlorinated

VOCs are associated with gasoline, fuel oils, and industrial solvents. These non-chlorinated VOCs are also persistent, but less toxic than the chlorinated solvents.

VOCs are very mobile and readily dissolve and leach into the ground water and other surface water resources. The most common sources of VOCs in water include gasoline and fuel oils from leaking tanks and spills; solvents, paints, pigments, and dyes from leaking tanks and improper waste storage and disposal; leaching of chemicals from atmospheric deposition of automotive and industrial emissions; and residuals from well disinfection.

This study was aimed to determine any contamination of ground water due to VOCs infiltration into the ground water in the vicinity of Petrol filling stations at Delhi during pre-monsoon, post monsoon and winter months. The depth of ground water sources ranged from 20 meter to 85 meter. Selected 43 Volatile Organic Compounds (VOCs) were analyzed in the water by Purge & Trap pre-concentration followed by GC-MS analysis using USEPA Method 524.2.

134 Ground Water samples were collected during year 2011-12 from 50 locations in National Capital Territory Delhi. The salient findings are presented in Table 6.5.

Table 6.5 : Volatile Organic Compounds in Ground Water (GW) samples collected in vicinity of Petrol Filling Stations in National Capital Territory Delhi

S. No	Volatile Organic Compounds	No. of sampling Locations	Total No. of samples collected	No. of GW samples in which the VOC detected	VOC Concentration (in ppb)	
					Min	Max
1.	Methylene-chloride	50	134	04	14.42	25.38
2.	Tri-chloromethane	50	134	20	02.77	175.43
3.	Benzene	50	134	02	20.69	79.05
4.	1,2 Dichloropropane	50	134	02	02.76	50.50
5.	Bromodichloromethane	50	134	09	02.55	36.59
6.	Toluene	50	134	03	09.63	54.14
7.	m-Xylene	50	134	03	03.02	06.74
8.	p-Xylene	50	134	01	-	05.47
9.	1,3 Dimethyl-benzene	50	134	02	03.17	20.76
10.	Tert-Butylbenzene	50	134	04	03.06	04.72
11.	1,2,3 Trimethylbenzene	50	134	01	-	04.21
12.	Butylbenzene	50	134	01	-	05.32

6.9 MONITORING OF PESTICIDE RESIDUES AT NATIONAL LEVEL

Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, Government of India and the nodal agency i.e. Project Coordinating Cell, All India Network Project (AINP) on Pesticide Residues, Indian Agricultural Research Institute New Delhi have been sponsoring a project "Monitoring of Pesticide Residue at National Level" to Central Pollution Control Board, Delhi since October 2006. CPCB is to evaluate pesticides levels in ground water, surface water and soil samples in National Capital Territory Delhi. About 112 locations of surface water and 100 locations for the Soil Samples have been selected and Monitored in National Capital Region i.e. Uttar Pradesh (Ghaziabad, Guatam Budh Nagar and Bagpat), Haryana (Sonepat, Faridabad and Ballabhgarh) and Delhi (Alipur Block, Kanjhawala Block, Najafgarh and Nizamuddin Bridge). During the year, the Monitoring of Pesticide Residue has been undertaken on monthly basis in about 70 surface water samples and 5 soil samples. The following groups of Pesticides being monitored on monthly basis:

Table 6.6 : Pesticides Monitored in surface water in National Capital Region

Pesticide group	Pesticides monitored (33 Nos.)
Organochlorine Pesticides: (14 Nos.)	α-HCH, β-HCH, γ-HCH, δ-HCH, Endosulfan-I, Endosulfan-II, Endosulfan sulfate, Dicofol, *p,p'*-DDE, *p,p'*-DDD, *p,p'*-DDT, Aldrin, Dieldrin, Heptachlor
Organophosphorous pesticides: (9 Nos.)	Chlorpyriphos, Dimethoate, Ethion, Malathion, Methylparathion, Phorate, Phosphamidon, Quinolphos, Profenophos
Synthetic Pyrethroids: (6 Nos.)	α-Cypermethrin, Deltamethrin, Fenpropethrin, Fenvalerate, λ-Cyhalothrin, β-Cyfluthrin
Herbicides: (4 Nos.)	Pendimethalin, Alachlor, Butachlor, Fluchloralin

The salient findings of monitoring are depicted below:.

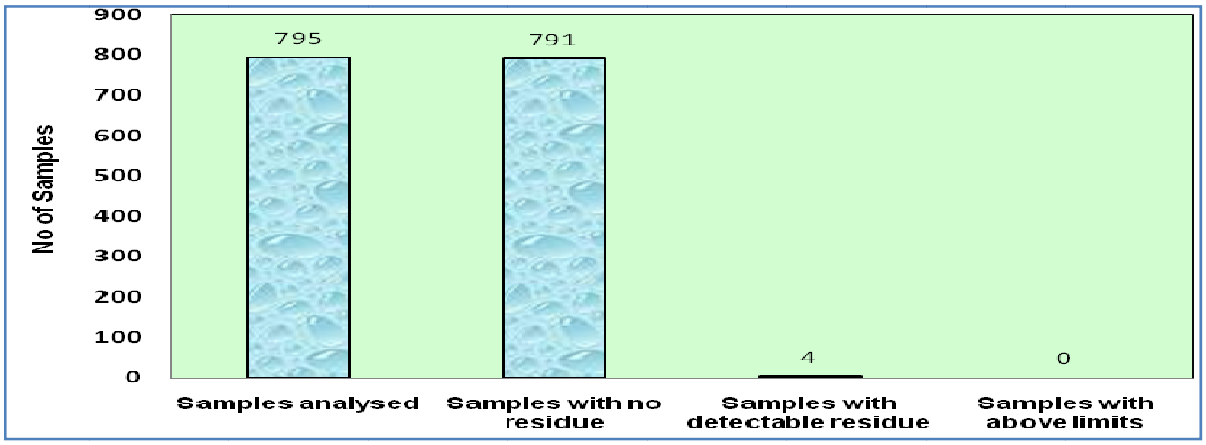


Figure 6.2 : Summary of Pesticides Analysis in Water Samples

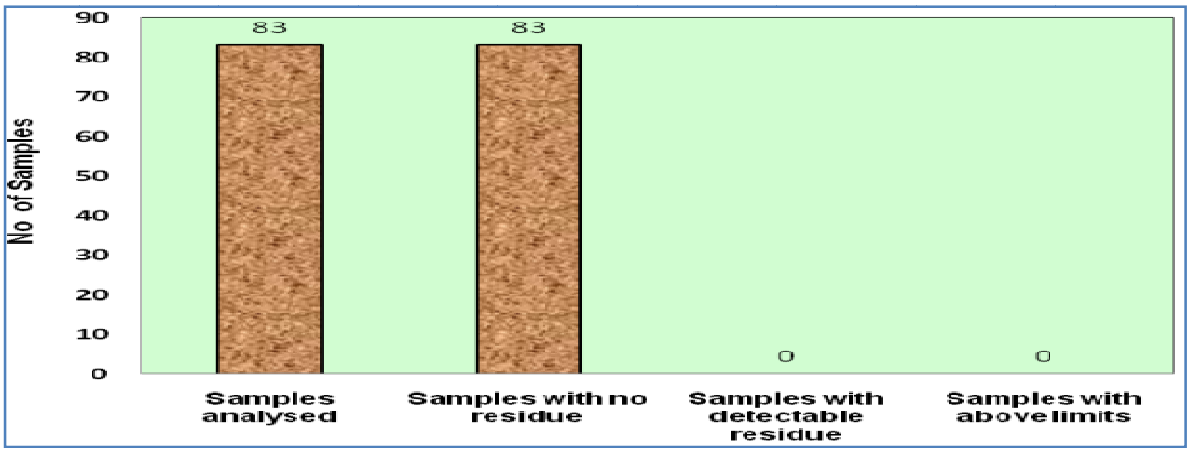


Figure 6.3 : Summary of Pesticides Analysis in Soil Samples

6.10 POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) DETERMINATION IN ROADSIDE SOIL

Polycyclic Aromatic Hydrocarbons (PAHs) are a group of persistent, bio-accumulative and toxic organic compound to invertebrates and mammals including humans. US EPA has designated sixteen PAHs as priority environmental pollutants. Poly-aromatic Hydrocarbons are released to the environment through anthropogenic and natural processes. Presence of PAHs in urban roadside soil and its humans exposure via inhalation, dermal contact and ingestion may lead to health impediments. This study was undertaken to determine the distribution, composition / profiles and sources of polycyclic aromatic hydrocarbons (PAHs) in roadside soils from Delhi.

The roadside soil samples were collected from various parts of National Capital Territory Delhi and subjected to analysis of 16 individual PAHs, sum of 16 PAHs (∑16PAHs) and seven carcinogenic PAHs (∑7c-PAHs). The concentrations of ∑PAHs were observed in the range of 81.9 µg/kg - 45017.4 µg/kg, with mean value of 6838.6 µg/kg. High molecular weight PAHs accounted for almost 93% of Total PAH.

Table 6.7 : Concentration of PAHs in Roadside Soils from Delhi (µg kg^{-1})

PAHs	Range		Mean	Standard Error	% of ∑PAHs
	min	max			
∑PAHs	81.9	45017.4	6838.6	3528.4	100
∑7c-PAHs*	<2.6	34514.8	4612.5	2723.8	67.4
LMW-PAHs	81.6	2479.9	470.3	190.0	6.9
HMW-PAHs	<3.5	42537.5	6368.3	3340.8	93.1

*Std Err=SD/√n, ∑PAHs=Sum of EPA's 16 PAHs, *∑7c-PAHs=Sum of 7 possible carcinogenic PAHs, LMW-PAHs=∑of 2-3 ring PAHs, HMW-PAHs=∑ of >4 ring PAHs*

6.11 POLY-CHLORINATED BIPHENYLS (PCBs) IN WATER AND SEDIMENTS OF RIVER YAMUNA IN DELHI

Polychlorinated Biphenyls (PCBs) are chlorinated organic compounds with one to ten chlorine atoms attached to biphenyl molecule. PCBs are odorless, tasteless, clear to pale yellow, viscous liquids. Individual chlorinated biphenyl molecules are called congeners, which are identified by the number and position of the chlorine atoms around the biphenyl molecule. PCBs were mainly used as insulating liquid in electric equipments prior to ban on their manufacture during seventies. However, several other uses of PCBs such as sealants, carbonless printing and plasticizers may be the possible sources of their release into the environment.

The assessment of PCBs levels in water and sediments of river Yamuna in Delhi was undertaken during the year 2011-2012. River water samples and bottom sediment samples were collected from five locations from Delhi Stretch of River Yamuna i.e. Palla, Wazirabad, Rajghat, Nizamuddin and Okhla. 28 individual congeners of PCBs, selected based on their toxicological significance, prevalence in biological tissue, were analyzed with GC-ECD. Concentrations of total PCBs (27 congeners) in Yamuna River water samples in Delhi varied from 2 ng L^{-1} - 779 ng L^{-1} with the mean of 99±38 ng L^{-1}.

The PCBs contamination levels in water of Yamuna River in Delhi were compared with guideline values stipulated by US National Oceanic and Atmospheric Administration and New Jersey Department of Environment. The concentrations of PCBs in Yamuna River water were found much lower than the guideline values.

6.12 POLYCYCLIC AROMATIC HYDOCARBONS (PAHS) IN WATER AND SEDIMENTS OF RIVER YAMUNA AND MAJOR DRAINS IN DELHI

This study was undertaken to determine the concentration levels and possible sources of PAHs in surface water and sediment of River Yamuna and major drains joining the river stretch in Delhi. Samples were drawn from six sampling locations at river and from six major drain outfalls joining the Yamuna River. Sediments and water samples were collected in three rounds of sampling from each sampling location and subjected to analysis of PAHs by High Performance Liquid Chromatography (HPLC).

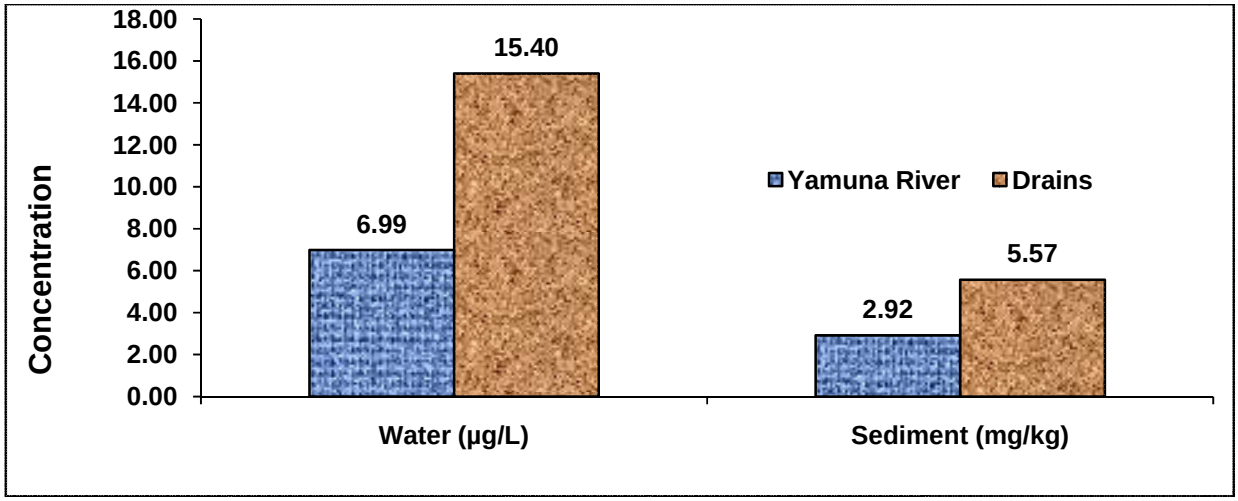


Figure 6.4 : Average concentration of Total PAHs (16 PAHs) in Yamuna River and Drains in Delhi

Average Total PAHs concentration in Yamuna water and sediment was observed 6.99 µg l^{-1} and 2.92 mg kg^{-1}, respectively, and in drains water and sediments it was observed 15.40 µg l^{-1} and 5.57 mg kg^{-1}, respectively. The carcinogenicity classifications by EPA suggest that Benzo (a) athracene, Benzo (b) fluoranthene, Benzo (k) fluoranthene, Benzo (a) pyrene, Chrycene, Dibenzo (a,h) anthracene and Indeno (1,2,3,cd) pyrene are considered to be probable human carcinogens and these are recognized as 7c-PAHs. The concentration of ∑7c-PAHs accounted for 44 to 97% of Total PAHs (∑PAHs) in Yamuna River and 17 to 40% in Drains.

6.13 ASSESSMENT OF PERSISTENT ORGANIC POLLUTANT (POPS) RESIDUES IN HUMAN POPULATION OF DELHI WITH SPECIAL REFERENCE TO ADVERSE HEALTH EFFECTS AND MORBIDITY

Persistent Organic Pollutants (POPs) are carcinogenic compounds of anthropogenic origin that resist degradation, persistent in the environment and accumulate in the food chain. These are linked to many health and environmental effects. Stockholm Convention has identified 12 POPs: organo chemicals - DDT, Aldrin, Dieldrin, Endrin, Chlorodane, Heptachloro, Mirex Texaphene; industrial chemicals–PCBs and HCB; and combustion by-products – Dioxin & Furan, for priority action. Persistent Organic Pollutants exposure to human being through food, water, accidents and occupational environment is a common phenomena because of which these are of global concern.

Most of the organo-chlorine pesticides POPs are persistent toxic contaminant having long half-life and tendency to be absorbed in human body through skin, inhalation, oral and placental route and tend to accumulate in fatty tissues.

Women having higher body fat percentage are prone to bioaccumulation of pesticides. The hormonal changes during pregnancy, lactation and menopause, mobilize the bio-accumulated pollutants in the body. The organo-chlorine pesticides can interfere in normal endocrine system, resulting in reproductive disorders and breast cancers.

This study has been undertaken by Central Pollution Control Board in collaboration with University College of Medical Sciences (UCMS) as collaborative project to generate epidemiological data and establishment of relative risk/relationship between the incidence of adverse health outcomes including cancer due to exposure to pesticides with special reference to organo-chlorine POPs residues and Poly-chlorinated Biphenyls (PCBs). The study involves:

- Determination of blood POPs levels such as organo-chlorine pesticides in infants with special reference to pre-term and IUGR infants.
- Determination of blood POPs levels such as organo-chlorine pesticides, organochlorine residue levels in children and teenagers of various age groups.
- Determination of blood and tissue organo chlorine and Polychlorinated biphenyls (PCBs) residue levels in adult and senior citizen populations with special reference to breast cancer tissue and prostate cancer patients.

During the three years project duration, blood samples from different age group such as infants children, teenagers, adult, and senior citizens were collected, processed extracted and cleaned up at University College of Medical Sciences & GTB Hospital laboratories and the concentrated samples were analyzed using GC-ECD at National Reference Trace Organics Laboratory of Central Pollution Control Board. The blood samples analysis results indicated presence of Organo-chlorine pesticides, Total BHC, Endosulfan and Total DDT in the adults of age group 40-60 years and senior citizens of age more than 60 years. There has been increasing pattern in pesticide levels in various age groups from infants to senior citizens. The pesticide Heptachlor was recorded in only one blood sample of adult in the 20-40 age group. The blood samples drawn from infants, children and teenagers were comparatively free from pesticides residue. The report of the study has been finalized in collaboration with UCMS & GTB Hospital.

6.14 RAIN WATER PROFILE OF AGRA AND LUCKNOW

The rain water, ionic profile study has been carried out at Agra and Lucknow with the aim to ionic characterization of rain. Total 55 no. of rain water samples were collected from Agra city during the study period (Feb-Sept 2011). The pH range of rain water samples was 6.03-7.56; and the conductivity ranged between 11 to 426 µS/cm. Total 5 no. of rain water samples were collected from Lucknow during the

period June-Aug 2011. The pH range of rain water samples was found between 6.05-7.06; and the conductivity of rain water ranged between 4.08 - 52.10µS/cm. The annual average values of different ions determined in the rain water samples collected from Agra city during year 2011-12 are presented below.

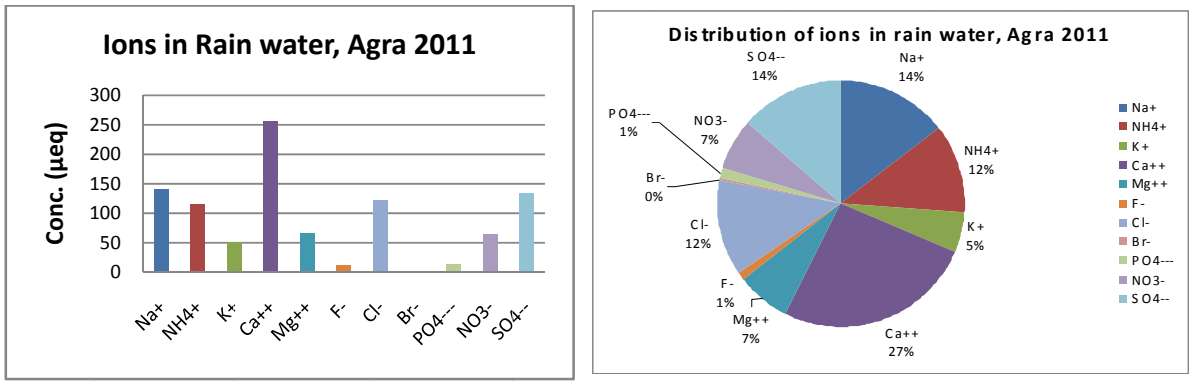


Figure 6.5 : Distributation of ions in rain water at Agra

Annual average level of Ca^{++} was found maximum (255.83 µeq/l) and of Br^{-} minimum (1.88 µeq/l) among all the analyzed ions in the rain water samples collected from Agra city. Among Cations, Ca^{++} contributed maximum (27%) and K^{+} contributed least (5%) whereas SO_4^{--} contributed maximum (14%) and Br^{-} was minimum (<1%) among Anions. Trend of average values of sum of cations and sum of anions in the monthly rain water samples collected from Agra is presented in Table 6.6.

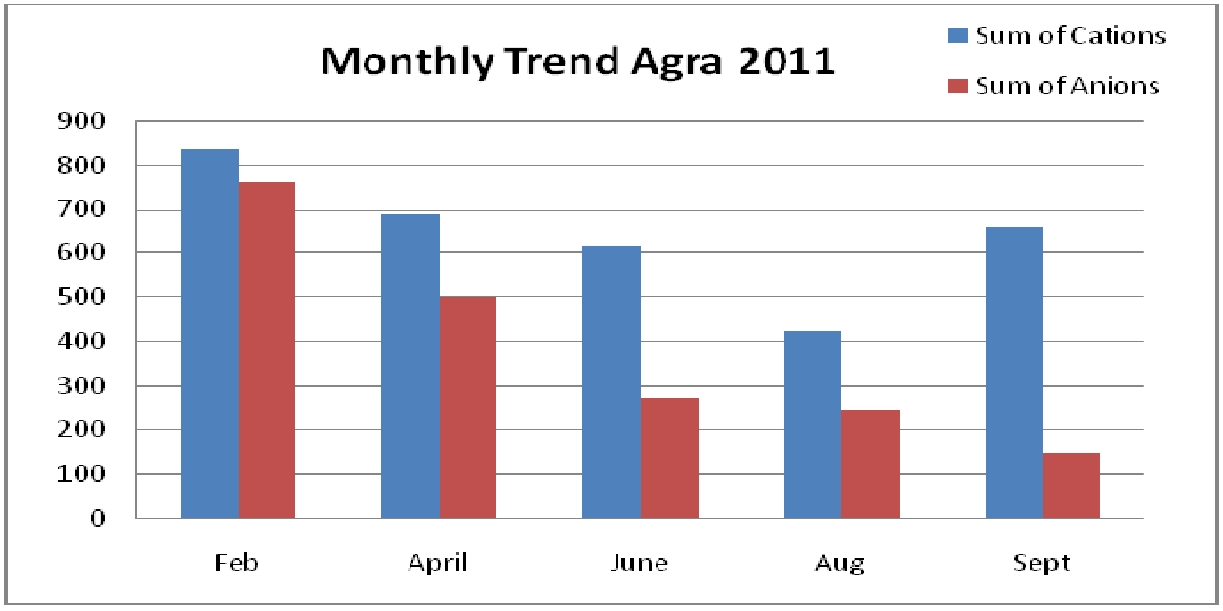


Figure 6.6 : Trend of average value of sum of Cations and Anions in Rain water samples at Agra

Sum of cations demonstrate a decreasing trend from February (836.45 µeq/l) to August 2011 (420.83 µeq/l) after that, an increasing trend was observed. In case of sum of anions, a continuous decreasing trend was observed from February (761.38 µeq/l) to September 2011 (146.09 µeq/l). The annual average values of different ions determined in the rain water samples collected from Lucknow city during year 2011-12 are presented in Figure 6.7.

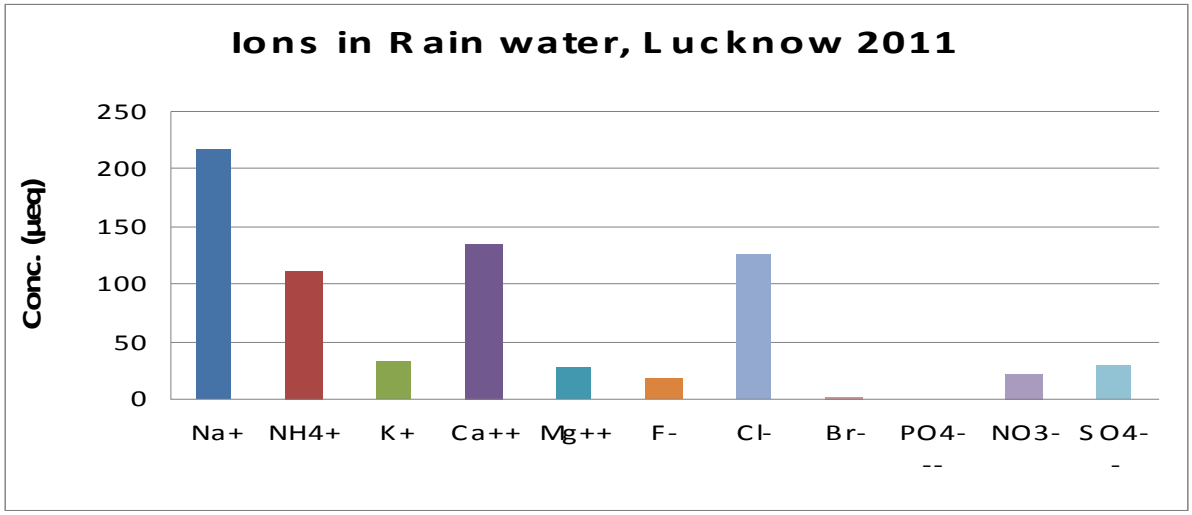


Figure 6.7 : Annual average of various ions in Rain water samples at Lucknow

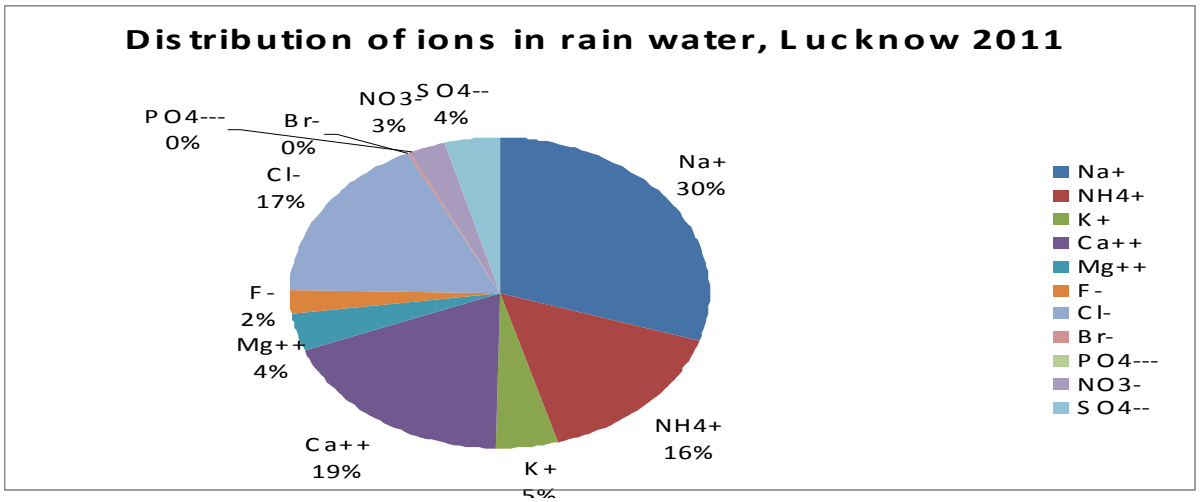


Figure 6.8 : Distribution of ions in rain water at lucknow

The annual average level of Na^{+} was maximum 216.80 µeq/l of Br^{-} minimum (1.58 µeq/l) among all the analyzed ions in rain water samples collected from Lucknow city. Among Cations, Na^{++} contributed maximum (30%) and Mg^{++} contributed least (4%) whereas among Anions, Cl^{--} contributed maximum (17%) and Br^{-} minimum (<1%).

6.15 STATUS OF HAZARDOUS WASTE MANAGEMENT IN OIL REFINERIES IN WEST ZONE

This study was undertaken for assessment of status of hazardous waste generation and management in different petroleum oil refineries in Gujarat & Maharashtra. A questionnaire was prepared and forwarded to all refineries in western zone. Based on inputs provided by the refineries, visits were made in selected refineries for detailed data collection on generation of various types of hazardous waste from different unit operations/process, to compare the existing management practices for hazardous waste handling, storage, treatment and disposal. During visit to refineries in Maharashtra state, it is observed that different refineries are producing different types and quantum of hazardous wastes because of the age of the refineries, different refining technologies adopted, nature of the crude they are refining, and the technology adopted to treat process effluent.

It has been found that there are disparities in the Authorization issued, probably because of the variation in facts submitted by refineries in their application. Variations not only in terms of specific generation but also in terms of types and categories were observed. It is felt that uniform yardsticks be developed for issuance of Authorization to oil refineries with respect to hazardous waste management.

Hazardous waste treatment and disposal in some petroleum oil refineries is still under evolution phase as research institutions are conducting experiments on bio-remediation and other methods. Feasibility of more treatment & disposal options including co-processing may be explored by refineries.

6.16. OIL SPILLAGE CAUSED BY DROWNED SHIP NEAR MUMBAI COAST

An incident of oil spillage occurred in Arabian Sea off Mumbai coast due to sinking of bulk carrier ship named M V Rak Carrier on August 4, 2011. A team from CPCB Zonal Office, Vadodara, visited the affected coastal areas and collected water samples during August 9 - 11, 2011. Chairman, Central Pollution Control Board, Zonal Officer (West) along with officials of Maharashtra Pollution Control Board (MPCB) also visited the affected coastal area of Mumbai on 9th August 2011.

Indian Coast Guards, MPCB and National Institute of Oceanography participated in the salvage operation and pollution control activities. Indian Coast Guards sprayed oil spill dispersant (OSD) to ensure that no oil reaches the shore of Mumbai. Regular cleaning of affected beaches was being done by Greater Mumbai Municipal Corporation workers.

In total 13 beaches were visited around Mumbai coast and Alibaug area. Water samples were collected from beaches. Visually no sign of oil spillage were observed at Rewas Beach, Mandave Beach, and Alibaugh Beach. Significant effect due to oil spillage and presence of tar balls on shore line and adjoining areas was noticeable and also substantive quantity of oil and grease was present in the water samples on beaches namely Awas Beach: O&G - 1138 mg/l, Kihim Beach: O&G - 416 mg/l, Madh Beach: O&G - 20 mg/l, Marve Beach: O&G - 20 mg/l, Versova Beach: O&G - 13 mg/l, Girgaon Chaupati: O&G - 27 mg/l, Juhu Beach: O&G -514 mg/l and 42 mg/l/ (repeated on next day), Worli Seaface: - O&G: 1544 mg/l and 118 mg/l (repeated on next day). The water sampling were repeated at Juhu beach and Worli Beach on next day reveals significant reduction in the concentration of oil and grease indicating gradual fading of impact of oil spillage incident.

6.17 ENVIRONMENTAL STATUS OF RAILWAY STATIONS

Central Pollution Control Board Western Zonal Office has carried out monitoring / inspections of Western Railway stations at Vadodara, Ahmedabad and the Diesel shed at Vatva, Ahmedabad to provide specific suggestions/recommendations for improving the environmental status and performance of the facilities based on the observations & assessment studies. Summary findings are as below:

- The total water consumption at Vadodara Railway station is around 3850 KLD while at Ahmedabad railway station it is around 2911 KLD for domestic, washing and housekeeping purpose. Approximately 80-85 % of total waste consumption is generated as wastewater per day.
- The wastewater generated from washing of tracks, platforms and also from toilets, railway canteen and other shops is being discharged directly into Municipal Corporation drains, which are treated in Sewage Treatment Plant (STP).
- Railway authorities are monitoring drinking water quality periodically but the wastewater, ambient air and noise level monitoring are not done by the railway authorities.
- Noise levels at all the platforms and the entry gate to the station/platform were higher than the prescribed limits. Both day-time and night-time noise levels have been found higher due to more frequent train and passenger movements.

- The solid waste is collected in bins and transported to Municipal Corporation containers for final disposal at MSW site. Plastic waste is not segregated and it is disposed along with the solid waste.

6.18 ASSESSMENT OF ENVIRONMENTAL POLLUTION OF AUTOMOBILE MANUFACTURING UNITS

The automobile manufacturing process involves various steps like (i) Ferrous casting (gray and ductile iron foundries) producing engine blocks, heads, and other parts, (ii) Aluminum casting (foundry and die casting) producing cylinder heads, transmission cases, engine blocks, and other parts, (iii) Other nonferrous die casting and electroplating, producing trim, hardware, and bumper, (iv) Hot and cold forging and heat treatment, producing engine, transmission, and suspension parts and other components, (v) Machining of engine blocks, crankshafts, transmissions, and other components, (vi) Pressing of sheet metal into body panels and other components, often combined with subassembly by welding, (vii) Manufacture of plastic body panels and trim components, (viii) Vehicle assembly, (ix) Distribution of the finished product etc.

In the manufacturing process, the unit generates wastewater, emissions, hazardous waste and solid wastes. The objective of this study was to assess the environmental pollution from the automobile manufacturing sector through monitoring of effluents and emissions.

Four manufacturing units (2 car manufacturing unit, one two & three wheeler unit and one truck unit) were inspected in south region to assess the environmental management practices existing in automobile manufacturing units.

6.19 MONITORING OF MUNICIPAL SOLID WASTE (MSW) PROCESSING FACILITY

A comprehensive monitoring of municipal solid waste (MSW) processing facility and landfill sites have been under taken by Central Pollution Control Board in South Zone for assessing the environmental impacts.

Salem MSW Processing facility:

Solid wastes generated in the Salem city from various sources like domestic, marriage halls, hospitals, schools and market areas are collected to the tune of 335 MT per day including 24 MT of vegetable market waste. The total MSW generated was dumped earlier at Erumapalayam dumping yard without proper treatment. The total extent of the dumping area is about 22 acres. In Feb 2011, an

integrated MSW processing unit was started at Chettichavadi Village with a processing capacity of 500 TPD.

Presently, the processing facility receives only 150 TPD of solid waste while, remaining waste is dumped at the dump site. Waste collection and transportation to the processing site is done by the Municipality. Except for the market waste other solid waste are not properly segregated at the collection point. The steps involved in the processing of municipal solid waste are collection of waste, segregation of waste as wet organic, dry organic, recyclable and inerts. In the plant the segregated waste is processed as: wet organic waste (20%-30%) for bio organic fertilizer, dry organic waste (30%-40%) for refused derived green fuel (RDF), recyclable (3%-5%), and inert (25%-30%) for land fill. The bio compost is sold for Rs. 2.30/- per Kg RDF for Rs. 1.20/- per Kg. The recyclable waste like plastic, metal and coconut shells are also sold out. The landfill site for disposal of inert material is not yet in operation; presently inert are stored in an open yard.

The following suggestions have been made for improvement:

- So the municipality should take necessary steps to bring all the waste to the processing facilities as well as simultaneously partial shifting of waste from old site to the processing site be carried out.

- Nearby localities are facing the problem of flies and odour form the drying process of waste for RDF. The plant needs to take necessary step to control these problems.
- Processed RDF is kept in the open area. The storage area for RDF needs to be increased.
- Inerts for landfill are stored in the open area, which may lead for ground water pollution. So the operation of the landfill site needs to be started as early as possible till then proper step be taken for the storage of inert material.
- The windrows for bio composting are maintained as per the standard criteria and the area for bio composting needs to be increased.
- The storm water drains near the processing area were found blocked by the waste.
- Green belt and housekeeping needs to be improved.

At time of monitoring, drying operation of dry waste was not carried out by the facility. So the static monitoring was not carried out. However Ambient air and groundwater quality have been monitored. The heavy metals such as copper, cadmium and iron have been found slightly higher than the standards (Table 6.8).

Table 6.8 : Groundwater quality of areas around Salem MSW landfill/processing site

S.No.	Parameters	Venkatachalm's Open well	Mariyappan's Open well	Bore Well (Inside Permises)
1	pH	8.2	8.5	8.2
2	Electrical Conductivity (EC)	905	751	642
3	Total Dissolved Solids	543	450	385
4	Total Hardness as $CaCO_3$	490	400	296
5	Calcium (as Ca^{++})	194	98	82
6	Magnesium (as Mg^{++})	1	38	22
7	Chloride	28.5	13.30	11.4
8	Sulphate	13	8	14
9	Sodium	15	14	11
10	Potassium	1	3	13
11	Copper	0.09	0.09	0.09
12	Cadmium	0.05	0.05	0.05
13	Chromium	BDL	BDL	BDL
14	Iron	0.39	BDL	0.73
15	Manganese	BDL	BDL	BDL
16	Nickel	BDL	BDL	BDL
17	Lead	BDL	BDL	BDL
18	Cobalt	BDL	BDL	BDL
* All values are in mg/l except pH & EC				

Table 6.9 : Ambient Air Quality in vicinity of salem MSW processing site

Sampling Locations	Air Quality Parameters (µg/m³)		
	PM_{10}	SO_2	NH_3
Near Admin Building	83	BDL	35
Near Landfill area	63	BDL	24

Namakkal MSW Processing Facility:

The solid wastes generated in the Namakkal city (46 MT/day) from various sources like households, commercial establishments, marriage halls, bus stand, parks/gardens, schools and market areas is collected. Out of 39 wards in Namakkal town, in 23 wards door to door collection is carried out through private agencies and remaining by the Municipality. Spot fine is imposed to those who litter the waste on streets and roads. Spot fine collected in the year 2008-09 and 2010-11 from the defaulters was Rs 23, 450 & Rs.1.20 lacs respectively. The 30 MT MSW is collected from the 23 privatized wards after segregation at the source, the waste of about 20-25 MT is sent to the processing facility at Kosavampatti. MSW from the remaining wards is disposed in nearby area by Municipality due to non availability of transportation vehicle.

The MSW processing plant at Kosavampatti receives about 20-25 TPD of solid waste. The recyclable wastes such as paper, plastics, glass etc. are segregated at source itself. The steps involved in the processing of municipal solid waste at the plant are manual sorting, primary segregation, shredding, and composting of biodegradable waste. The separated non-biodegradable waste for landfill is kept in the open yard. This 20-25 TPD of solid waste contains 8 – 10 MT of biodegradable waste and 10-15 MT of non-biodegradable waste. The total area available in the processing plant is about 8.53 acres. The biodegradable waste is sent for vermi composting and bio composting.

Wastes from markets, Marriage halls etc are Vermi composed. Waste from other areas such as Households, Commercial establishments etc are sent for bio-composting. After Bio-composting the composted waste is fed to the secondary segregator for further separation. The vermi compost and bio compost are sold for Rs. 3 per Kg and Rs. 2 per Kg respectively. The landfill site is at Lathuvadi having the area of about 13.11 acres, which is more than 10 Km. away from the processing facility at Kosavampatti. The area covered for land filling is 6000 Sq.m (80 x 75 m). The leachate collection provision is provided in the landfill. The collected leachate proposed to be solar evaporated. The solar evaporation pond is not proper, only HDPE sheet is provided in the ground pit. The landfill site for disposal of non-biodegradable material is not in operation yet. Non-biodegradable

waste is not shifted to Lathuvadi landfill site due to non availability of transportation vehicle and the non-biodegradable material is presently being kept in open yard at processing site, Kosavampatti.

Figure 6.9 :Vermi Composting and Bio Composting

Figure 6.10 : View of Landfill and Solar Evaporation Pond

- The municipality needs to take necessary steps to take all the waste to the processing facility.
- The landfill waste is to be shifted more than 10 Km away from the landfill site at Lathuvadi, which is away from the residential area. Municipality may consider shifting of the processing plant to Landfill site, so that the transportation cost, manpower etc of waste handling will be reduced.
- Steps needs to be taken for proper storage/disposal of landfill waste.
- Proper solar evaporation pond for evaporation of leachate needs to be constructed.
- Green belt and housekeeping shall also be improved.

Ambient air and groundwater quality were monitored. Results presented in Table 6.10.

TDS (as well as Total Hardness, Chloride and Sulphate) are found in higher concentration. Copper, Cadmium and Iron are also slightly higher than the standard.

Table 6.10 : Groundwater quality characteristics of areas around Namakkal and MSW Processing site

S. No	Parameters	Open well	Bore Well
1	pH	7.5	7.8
2	Electrical Conductivity (EC)	4900	2670
3	Total Dissolved Solids	3278	1748
4	Total Hardness as $CaCO_3$	1480	1133
5	Calcium (as Ca^{++})	209	137
6	Magnesium (as Mg^{++})	233	192
7	Chloride	663	382
8	Sulphate	649	25
9	Sodium	425	264
10	Potassium	134	30
11	Nitrate	22	24
12	Ammonical Nitrogen	6	6
13	Copper	0.07	0.08
14	Cadmium	0.05	0.05
15	Chromium	BDL	BDL
16	Iron	0.32	BDL
17	Manganese	BDL	BDL
18	Nickel	BDL	BDL
19	Lead	BDL	BDL
20	Cobalt	BDL	BDL

** All values are in mg/l except pH & EC*

Table 6.11 : Ambient Air Quality near Namakkal MSW Processing site

Sampling Locations	Air Quality Parameters (µg/m³)		
	PM_{10}	SO_2	NH_3
Near Bio-composting yard	92	BDL	21
Near security gate	116	BDL	44

6.20 IMPACT OF JHUM CULTIVATION ON AIR QUALITY IN MIZORAM-MANIPUR- ASSAM-MEGHALAYA

Impact Assessment of Jhum Cultivation on Environment in North Eastern States was initiated since year 2008 by Central Pollution Control Board Zonal Office, Shillong. Jhum cultivation is the main occupation of the Hill Tribes in North

Eastern Region. During year 2011-2012 assessment of Jhum burning on the environment of the area was conducted in four states.

During the assessment of the air quality before burning, the levels of Respirable Suspended Particulate Matter in most of the Jhum areas were found lower than 100 µg/m^3, whereas the levels during the burning period ranged from 200-250 µg/m^3. During the burning period the levels of Carbon Monoxide (Ambient CO) increase even up to 200 mg/m^3.

If Jhum Cultivators in the four states reduce the time for burning of Jhum, the time of exposure which lasted for one and half months can be brought down to fifteen days. Reduction in burning time is found successful in reducing the exposure time of the people in the areas to high SPM and Ambient CO, and reducing the impact on the environment. Jhum cultivators also need to find some alternative occupation other than Jhum cultivation as Jhum cultivation results in degradation of land which may be non-reclaimable in the long run.

Figure 6.11 : Jhum field waiting for burning

Figure 6.12 : Degraded Jhum land

6.21 MONITORING OF LARGE CEMENT PLANTS AT LUMSHNONG, MEGHALAYA

Eleven (11) large operational cement plants in Jaintia Hills of Meghalaya, especially in Lumshnong and its surrounding areas, have been monitored by Central Pollution Control Board. The capacities of these cement plants vary between 900 TPD to 5000 TPD. All these cement units are having captive lime stone mines with mining lease areas varying from 1.5 Ha to about 70 Ha. A few units are having coal based captive power plants.

Table 6.12 : Large Cement Plants at Lumshong, Meghalaya

S. No	Unit	Year of commissioning	Production Capacity, TPD	Area under captive limestone mine (hectares)
1	Cement manufacturing company Limited	2004	1800	Wah Pynkon Mine: 4.85 CMCL Mine : 35 ha CMCL Khub 1 mine:4.96 Ha CMCL Khub II mine:4.70 Ha
2	Meghalaya Cements Limited	2006	900	Rymai Snden Mine: 4.9 Khliehjari limestone mine: 4.88 Meghalaya Cements Limited: 44
3	Adhunik Cement Limited	2011	OPC : 3900 PPC : 4800	Limestone Mineblock –I : 4.90 Ha Limestone Mineblock –II : 4.90 Limestone Mineblock – IV : 4.90
4	Hills Cement Company Limited	2009	1000 (1st phase)	69.4 Hills Cement Company Limestone mine: 4.0 ha
5	JUD Cements Pvt Limited	2009	900	4.76
6	Green Valliey Cement Pvt Limited	2011 (I Phase) 300 TPD	Clinker:2000 Cement: 2600	
7	Amrit Cement Limited	Not yet commissioned	Clinker: 4303.03 Cement : 4545	30
8	Star Cement Meghalaya Limited	Target Commg.: October 2012	Clinker : 5300	75
9	Goldstone Cement Limited	Not yet commissioned	Clinker : 1250	41.50
10	Cosmos Cement Limited	Not yet commissioned	Clinker: 4500 Cement : 6250	160
11	Megha Technical & Engineers Pvt Limited	Not yet commissioned	Cement: 2040	1.5

The rapid growth of these large air polluting industries, together with captive mining and captive thermal power plants may result in adverse effect on the surrounding environment. All plants have installed various air pollution control devices (ESPs, Bag Filter. etc) to control the source emissions at its various units. Emission monitoring was carried out to monitor the compliance by the industries and also to assess the pollution load from the cement plants. It was found that the industry specific emission discharge standards as emissions from the various cement units were within 50 mg/Nm^3. However, uncontrolled fugitive emission was observed at most of the cement units, especially in fly ash handling areas.

6.22 ENVIRONMENTAL STATUS OF COAL MINING AREAS OF JAYANTIA HILLS, MEGHALAYA

The coal reserve deposits in Jaintia Hills of Meghalaya are estimated to be 569.00 million tones (approx.) and these coal reserves are deposited in five major coal belts– Iorsky, Sutnga, Khlehriat, Jariang and Lakadang. The coal mining activities in Jaintia Hills are concentrated mainly in Wapung, Lad-rymbai and Khlehriat areas. The Coal is of high caloric value i.e. 7000 K. cal/kg. Sulfur content varies from 3.7 (in Bapung) to 6.9 % (in Khlieriat) and ash content varies from 6.0 (in Bapung) to 28.1 % (in Lumshnong). Generally, the depth of coal deposit varies from 1 meter to 15 meters. The seam thickness is usually 0.1 to 3.5 meters. Rat hole mining, unorganized and unscientific system of mining is practiced in this area and there is no improvement in mining technology, coal storage system and transport system. The mining holes (rat holes) are left without capping/cover which many times over-flow with acidic discharge during rainy seasons. Unorganized/un-scientific method of vertical mines is also practiced. The discharges from these mine holes are pumped out without any treatment and discharge to natural drainages and rivers. During rainy seasons the vertical mines are found over-flowing with acidic water of pH as low as 2.0. There are no treatment facilities for these over flowing Acidic discharges.

Figure 6.13 : Kmai Um River Receiving Acidic Discharge

Figure 6.14 : Sarbong River Receiving Acidic Discharge

There is no proper management of over-burden from the mining activities. The over-burden are openly dumped nearby the mines. Siltation due to overburden pollutes/damages the low lying lands in the areas. Cultivation of crops and growing of vegetation in the low lying areas is practically not possible due to open dumping of overburden, siltation and acidic discharges.

Open dumping/storages of coal is also one of the major problems of the mining areas. The acidic discharges from the dumping sites are also released to natural drains without any treatment. There are no lining to protect the acidic leachate/ effluent from entering the ground water/surface water. Siltation due to open dumping of coal is common in all low lying areas. The acidity of the river water flowing through the mining areas is very high during dry season as the pH of the water is very low (2.3 to 4.5).

6.23 ENVIRONMENTAL STATUS OF COAL MINING AREAS OF ASSAM AND ARUNACHAL PRADESH

Coal mining activities imparts environmental degradation in the mining areas and its surroundings. There are open cast coal mines in Assam (Makum Coalfield) and Arunachal Pradesh (Nachik-Namphuk Coalfield). In Makum Coalfield, mining is undertaken by North Eastern Coalfield Limited of Coal India Limited, following both open-cast mining and underground mining processes, while mining in Nachik-Namphuk coalfield is undertaken by state owned agency through open cast mining.

Coal mining is imparting adverse impact on the water and soil environment in and around the mining areas. The mining areas were studied to characterize the mine discharge and Ground water quality. It is found that the mine discharge from the coal mines is very acidic (with pH 3 to 4) and is laden with heavy metals (As, Cu, Cr, Ni, Pb, Hg, etc).

6.24 MONITORING OF POLLUTING INDUSTRIES IN NORTH EAST STATES

Fifty one (51) Industries were monitored by Central Pollution Control Board Zonal Office, Shillong during year 2011 -12 in the states of Arunachal Pradesh, Assam, Meghalaya, Sikkim and Tripura. These inspections include monitoring of twenty one (21) Industries under the ESS Programme, and monitoring of thirty one (31) other polluting industries in North Eastern States especially in Assam, Meghalaya, Sikkim and Tripura.

The regular monitoring of the polluting industries, technical suggestion to the industries during the visit for better environmental management, and specific

directions from CPCB to the industrial units or State Boards for betterment in environmental pollution control, are contributing towards improvement in environmental management in NE states.

6.25 FLUORIDE CONTAMINATION IN GROUND WATER IN WEST BENGAL

Central Pollution Control Board, Zonal office East Kolkata has been carrying out monitoring of groundwater in rural areas of Birbhum and Purulia districts since 2007 to assess the spatial and temporal trend of fluoride content. 55 tube wells in affected blocks of Purulia and Birbhum districts in West Bengal were monitored. During the year to assess temporal and spatial distribution of fluoride, the trend of fluoride concentrations and interrelation among the different parameters.

The fluoride content in the groundwater showed significant variation in different blocks in Birbhum and Purulia districts. The fluoride concentrations were varying from 0.5 to 3.5 mg/l in Purulia district and 0.2 to 12.3 mg/l in Birbhum district with maximum concentration of 3.5 mg/l and 12.3 mg/l observed at Purulia and Birbhum respectively. The fluoride above permissible limit (1.5 mg/l) were found in 5 tube wells of Khairasol block, 11 tube wells of Rampurhat block of Birbhum District, and 4 tubewells of Jiapur block of Purulia district. People in these blocks are suffering from different fluoride borne diseases (fluorosis). This spatial and temporal variation may be attributed to seasonal influence and abstraction of groundwater. Treatment device has been implemented in two tube wells of Rampurhat block but efficiency of the device was unsatisfactory due to poor maintenance. The level of fluoride contamination have been categorized into three classes (I) 0 – 1.5 mg/l, (II) 1.5 – 3.0 mg/l, (III) > 3 mg/l. Out of 55 investigated tubewells, 78% tubewells were in Class I, 13% tubewells in Class II and remaining tubewells in Class III. Most of the contaminated tubewells were found in Birbhum districts. These two districts are in the Gondwana and Vindhyan deposits of Archean rock sporadically enriched with Flouride. The fluoride contamination is geogenic (water-rock interaction) origin, which is accelerated by human activities (abstraction of groundwater, poor recharging etc).

6.26 CHEMICAL CHARACTERIZATION OF GROUNDWATER IN ARSENIC AFFECTED AREAS

The natural contamination of groundwater with Arsenic becoming critical factor affecting human health. Use of arsenic contaminated water in irrigation and other domestic purposes leads to environmental problems by contaminating soil and surface water. The arsenic contamination particularly in West Bengal and Bihar is regularly monitored by Central Pollution Control Board since year 2002. Arsenic

mobilization mechanism varies with the location depending on hydrological condition. Influence of various chemical species like calcium, magnesium, nitrate, sulfate, bicarbonate, iron, phosphate, manganese, zinc was examined for predicting mechanism of arsenic mobilization in groundwater. Better understanding of the cause of arsenic contamination, geology and geomorphology have been detailed in this study because it is reported that the arsenic contamination in groundwater are controlled by complex set of conditions and processes.

Groundwater samples collected from shallow and deep tube wells were collected and analyzed to present chemical characteristics of groundwater. The groundwater has been mildly acidic to mildly alkaline (pH 6.6 to 7.7), and reducing in nature as negative ORPS is observed. Average values of conductivity ranged 166 to 1620 µmhos/cm, with highest value at Nadia, and average values of TDS ranged 91 to 963 mg/l, with highest value at Nadia. The bicarbonate and total hardness in groundwater follows similar trend as observed for TDS and conductivity. The average calcium ranged between 21 to 162 mg/l, with highest value at Nadia, which shows dominance of weathering of calcium rocks. Phosphate ranged between 0.01 to 1.69 mg/l, with highest value at Baruipur, and nitrate ranged 0.01 to 9.15 mg/l, with highest value at Malda. Iron concentrations varied from 0.01 to 7.0 mg/l.

Arsenic concentration was found above 0.01 mg/l ground water of about 50 percent tube wells. In these districts, prevailing concentrations of calcium, magnesium, sulfate, iron and arsenic in about 25 percent tube wells were remarkably high. It is observed that both iron and arsenic concentrations were higher in shallow depth tube wells though in deep tube wells that consistency was not observed. Correlation coefficient indicated good correlation between iron and arsenic; and between phosphate and arsenic in shallow tube wells. No seasonal variation of arsenic was observed. Prevailing arsenic concentrations of groundwater do not exhibit any systematic (inclining/declining) trend.

6.27 WATER QUALITY OF RIVERS IN MOUNTAIN AREAS OF WEST BENGAL AND ARUNACHAL PRADESH

It has been evaluated by Central Pollution Control Board water quality in Mountain rivers in West Bengal and Arunachal Pradesh so that detection of any changes of water quality can be prevented through watershed management programme and for understanding of water pollutant dynamics. The monitoring of the rivers in Arunachal Pradesh (Poma, Ranga, Doimukh and Hang) and West Bengal (Teesta, Leesh, Mal, Murti, Torsa, Jaldhaka and Mahanadi) has been undertaken during the year. The results revealed that pH values observed in all

sampling campaign are near neutral (7.2 and 7.7). The pH of these rivers represents an abrasion pH containing major minerals (micas, carbonates, clays, calci plagioclase, quartz, dolomite etc) which are abundant in the basins. The pH value decreases slightly after rainfall and thereby it is expected that slightly acidic rainwater is added to the river. The conductivity values varied from 123 µmhos/cm to 224 µmhos/cm in Arunachal Pradesh and from 14 to 123 µmhos/cm in West Bengal during low flow period. Decrease of conductivity value during high flow period indicated dilution effect on soluble salts due to surface run off. Relatively high conductivity in lower stretch of all these river adjacent to settlement and small towns indicated the impact of domestic wastewater on river water quality, particularly in River Ganga at Chandra Nagar station in Arunachal Pradesh and River Sevakin West Bengal.

The distribution of other ions such as calcium, magnesium, chloride, sulphate etc. is similar to the conductivity. The soluble salts levels prevailing in hilly river indicate still maintaining of pristine water quality. TSS concentration of 25 mg/l in Mahananda and 74 mg/l in Leesh river during low period increased to 1777 mg/l and 1759 mg/l respective during high flow period. Transportation of sediment is prominent. The consistent values of other ions in both the seasons indicated stable dissolution of weathering rock. PO_4-P and NO_3-N concentration during dry period was found relatively high during high flow period. Production of NO_3 and PO_4 in the watershed is controlled through ammonification of organic matter and mobilized into the river through run-off. The microbiological contamination prevails in the river though fecal sources are mainly wild animals. The microbiological contamination was found increased due to surface run-off into the rivers. The upstream portion of these rivers is pristine, while the downstream portion passes through inhabited, small towns and agricultural field and indicates some impact of anthropogenic activities on stream chemistry. The relatively high concentrations of alkali earth metals (Ca and Mg) and high alkalinity suggest dominance of carbonate weathering in river basins.

6.28 NUTRIENTS AND ORGANIC DYNAMICS IN RIVER MAHANADI

The River Mahanadi is a major River in East Central India which drains an area of around 141600 km^2 with total course of 858 km. The River flows through states of Chattisgarh, enters the plains of Odisha near Cuttack and forms a delta, before joining Bay of Bengal at False Point through several channels. The average annual discharge of Mahanadi river basin is 1835 m^3/sec with a maximum of 6352 m^3/sec during the monsoon and minimum of 759 m^3/sec during June. The world's largest earthen dam - Hirakud controls the flow of Mahanadi. The largest segment of population in Odisha lives along the Rivers, relying on them for trade, agriculture and industrial uses often leads to deterioration of water quality. In the

face of increasing population growth and industrial development, the natural balance of chemical species can be affected by anthropogenic domestic and industrial activities. Central Pollution Control Board Zonal Office Kolkata has undertaken study to investigate the nutrients and organic dynamics of River Mahanadi in Odisha and to generate Water Quality Data.

The analytical results indicate that pH varied from 6.8 to 7.13. Higher values of conductivity and TDS indicate prevailing salt concentration in river during summer season. Conductivity values showed seasonal influence and influence of sea water at Paradeep. Relatively high concentrations of alkali earth metals, Ca and Mg, accompanied by high concentration of anion bicarbonates in non saline zone suggest dominance of carbonate weathering in the basin. The temporal variation in the TDS and ions in river water are largely governed by the rainwater dilutions during monsoon.

Concentration of TKN, NH_3-N, NO_3-N and PO_4-P varied between 0.6 to 2.4 mg/l, BDL to 0.064 mg/l, 0.01 to 0.37 mg/l and 0.01 to 0.127 mg/l, respectively, during wet season and formed decreased during dry season. Generally NH_4 and NO_3- ions are produced in the watershed through ammonification and nitrification of organic matter and mobilized into river through surface run-off during monsoon leading to increase of nutrients. The lower values of nitrogen during dry season as compared to wet season may be attributed to uptake of these nutrients by plants in the basin and reduction of effective surface runoff to water. Relatively high phosphate concentrations during wet season may be attributed to increased weathering, uncontrolled discharge of domestic and industrial wastewater and mineral fertilizer. The maximum values of (0.127mg/l) of phosphate during summer season observed at the mouth of Bay of Bengal may be due to discharge from a fertilizer plant. The organic substances in terms of COD and BOD showed similar trend to that of nitrogen and phosphorus.

6.29 SUSPENDED SEDIMENT ASSOCIATED CONTAMINANTS IN RIVER HUGLI AND MAHANADI

Central Pollution Control Board, Zonal Office Kolkata has undertaken a study to assess the level of metal ions in river water is influenced by suspended solids in response to spatial and temporal conditions, and role of absorbance of metal ions in TSS in river Ganges and Mahanadi including estuarine zone. The 240-km-long stretch of the river Ganges in Bihar and West Bengal between Buxar (Bihar) and the mouth of Bay of Bengal (WB) at 18 locations and 87-km stretch of river Mahanadi between Cuttack and Paradeep at 5 locations have been studied.

Coefficient of variation of TSS concentrations (CV 94%) indicates wide variations among the 18 sampling sites in river Ganges and five sampling site in Mahanadi. Tidal energy, upland flow, irregular estuarine geometry are the key factors influencing spatial variability of TSS.

Coefficient of variation of all the metal ions varied from 54% to 124% indicating wide variation in both Ganges and Mahanadi. Major fraction of metals (Fe- 95% , Mn- 34%, Cu- 75%, Pb- 70%, Ni- 80%, Co- 75%, Zn- 60% and Cr- 65%) have been associated with TSS. Correlation coefficients indicated positive correlation of TSS with metals, Fe (r-0.79), Mn (r-0.79), Cu (r-0.78), Pb (r-0.24), Ni (r- 0.69), Cr (r-0.41), Co (r-0.48) based on 37 observations. A detailed investigation on relative distribution of metals between dissolved and particulate phases in rivers is suggested.

6.30 METALS CONTAMINATION IN FRESHLY DEPOSITED SEDIMENT OF HUGLI AND MAHANADI

Estuarine region are the important sinks for metals which are accumulated in living organisms and bottom sediments. Central Pollution Control Board Zonal Office Kolkata has undertaken investigation of chemical composition of freshly deposited sediment in these zones to evaluate the geochemical processes controlling the metal contamination in response to spatial and temporal condition. The study includes 240-km-long stretch of the river Ganges between Buxor (Bihar) and the mouth of Bay of Bengal (West Bengal) at 18 locations and 87-km stretch of river Mahanadi between Cuttack and Paradeep..

The analytical results of each river were satisfactory processed to derive mean, median, SD, CV, maximum, minimum, skewness and kurtosis of metals , organic matter, carbonate and sediment texture (sand, silt and clay).

The mean values of various parameters in µg/g are: Fe:21685, Zn:70, Mn:484, Cu:22.9, Cd: BDL, Co:9.6, Cr: 20.9, Pb: 10.79, Ni: 21.09, pH: 7.9, Sand: 83.72, Silt:12.41, Clay:3.87 and Organic Carbon :0.31. Coefficient of variation of various parameters in percent are: Fe:31, Zn:43, Mn:33, Cu:43.0, Cd: BDL, Co:30.1, Cr: 36.0, Pb: 61.5, Ni: 32.6, pH: 4.9, Sand: 13.97, Silt:71.50, Clay:78.44 and Organic Carbon :0.72.

Good agreement between mean and median of the metal concentrations exhibits normal distribution of the datasets in the study area. The analytical results indicated that prevailing fluctuation of metal concentration over the sampling sites was related to the sediment properties. Poor correlation of Pb, Ni and Cr with other metals exhibited their independent origin (anthropogenic sources).

6.31 IMPACT OF MANGROVE ECOSYSTEM ON EMISSION OF GREEN HOUSE GASES

Central Pollution Control Board had undertaken an in-depth survey in the selected forest in Sunderban biosphere reserve, with main focus on dense forest of Jharkhali, to establish baseline data of possible greenhouse gases in ambient air with respect to characteristics of mangrove soil. The availability of various species of plants in the forest have economic importance for their alkaloids, which also contribute to biogenic VOCs in the atmosphere.

The pH of the soil of Jharkhali forest varies from neutral to saline (pH 7.2 to 8.1). Soil of the forest is silty clay as evident from the textural estimation. Organic carbon is moderate to very high i.e., (0.66-1.32 %) except the surface soil of one site (0.45%) which might be due to removal of dissolved organic carbon by saline water intrusion. Available nitrogen of the soil ranged from 107 to 160 Kg/ha. Available nitrogen of the soil at 45 cm depth varies from 107 to 160 Kg/ha and 1 m depth 3ft. varies from 107 to 151 Kg/ha. In both the depth available nitrogen was varying from low to medium which might be due to mineralization of plant litter by saline water. The mineralization of organic matter and available nitrogen by saline water may result in the contribution of CO_2 and different forms of nitrogen in the air.

6.32 TRACE METAL CHARACTERIZATION OF SOLID AND HAZARDOUS WASTE USING ICP-AES

Trace metals in environment matrices are measured by various analyzed methods such as coloumetric, voltametric, atomic absorption spectro-photometry, inductively coupled plasma etc. Trace metal analysis using ICP-AES is relatively simple, accurate and free from interferences. Few samples of solid waste/ Hazardous waste were collected from Okhla STP and Jhilmil CETP and were found to contain various metals such as Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn etc. (Table 6.13).

Table 6.13 : Metal characterization of solid waste from okhla STP and Hazardous waste of CETP.

Sample Code	As mg/g	Cd mg/g	Cr mg/g	Cu mg/g	Fe mg/g	Mn mg/g	Ni mg/g	Pb mg/g	Zn mg/g
STP Okhla 12 MGD	BDL	BDL	0.099	0.236	3.880	0.088	0.032	0.047	0.277
STP Okhla 30 MGD	BDL	BDL	0.618	0.921	10.500	0.146	0.158	0.056	0.757
STP Okhla 45 MGD	BDL	BDL	0.015	0.078	9.760	0.094	BDL	0.022	0.150
CETP Jhilmil	BDL	0.002	10.90	18.30	48.000	0.405	3.970	0.660	7.015

6.33 ANALYSIS OF ADSORBABLE ORGANIC HALOGENS AOX IN INDUSTRIAL EFFLUENTS USING AOX ANALYSER

Adsorbable Organic Halides (AOX) are the organic compounds bounded with halides viz. Chlorine, Bromine, Iodine. These are generated in the pulp and paper industry during the bleaching process. These compounds are formed as a result of reaction between residual lignin from wood fibres and chlorine/chlorine compounds used for bleaching. Many of these compounds have long half-life periods. Some of them show a tendency to bioaccumulate while some are proven carcinogens and mutagens. The measurement of these compounds is achieved by adsorption of the effluent on to activated carbon and combustion and titration of the adsorbed carbon using AOX Analyzer.

Under this study more than 10 pulp and paper units, which are involved in bleaching process and situated in surrounding states of Delhi were identified for monitoring. Five of these pulp & paper industries were visited and samples from inlet and outlet of ETP were collected and analysed for assessment of AOX concentration.

6.34 INVENTORISATION OF INDUSTRIAL CLUSTERS AND ASSESSMENT OF THE UNMET NEED FOR CETPS

Central Pollution Control Board on advice of Planning Commission and on behalf of Ministry of Environment & Forests, Government of India (MoEF) has taken up the network study 'Inventorisation of industrial clusters in the country and assessment of the unmet need for common effluent treatment plants' in association with different institution in six zones of the country:

Table 6.14 : Participatory institutions in network study of inventerization of Industrial clusters

Zone	States	Institute
Northern Zone	J&K, H. P., Punjab, Haryana, U.P., Uttaranchal, Chandigarh, Delhi	TERI-New Delhi
Central Zone	Rajasthan, M.P., Chhattisgarh	IIT-Kanpur
Southern Zone	A.P., Karnataka, Kerala, Tamil Nadu, Goa, Pondicherry	EPTRI-Hyderabad
Western Zone	Gujarat, Maharashtra, Daman Diu and D&NH	IIT-Bombay
Eastern Zone	Bihar, Jharkhand, Orissa, West Bengal	CPCB Zonal Office, Kolkata
North-Eastern Zone	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim	CPCB Zonal Office, Shillong

The study was awarded to identify institution during the year 2011-12 and expected to be completed during year 2012-13.

6.35 MEASURES TAKEN TO REDUCE AIR POLLUTION

To control air pollution from vehicles, industries and other sources. Various measures had been initiated. The steps taken to control air pollution from vehicles and industries are as follows:

Measures taken to Reduce Vehicular Pollution

Automobile Pollution Control initiatives gained marked enforcement of various control measures ranging from notification of advanced Euro-IV equivalent emission norms and commensurate fuel for new vehicles to stricter exhaust emission limits for in-use vehicles, augmentation of infrastructures for alternative fuels and mass transits and other urban planning and management options. The implementation of the road map as recommended by the Auto Fuel Policy of India has been continued during the year. The vehicular pollution control framework in the country has now shifted its focus towards integrated control and management options and has extended its domain to cover all major metro cities and no more restricted only to capital of India. Important measures pertaining to vehicular pollution control initiated during year 2011-12 are as follows:

Alternate Fuels - Initiatives

There has been lot of developments in this front when various organizations including the Planning Commission, Oil Companies, Auto Sectors, Central Pollution Control Board and other research agencies initiated various demonstration and feasibility studies with alternative fuels like LPG and bio-diesel (B20) in the country. Some of the developments are depicted below:

- Bio-fuels mainly Ethanol and Biodiesel (in B20 form) are the prospective options for India. Several Pilot studies on ethanol and biodiesel have been completed while many many are on-going.
- Efficacy of B20 biodiesel from Jatropa feedstock has been established and experiences gained through some pilot studies. Introduction of biodiesel starting with lower blends like B5, B10, etc. is a possibility now.
- Work is on to introduce bio-diesel in the form of B20 as an automotive fuel in India. Several research studies and field trials have been initiated by Organizations like –IITs, IOC, Mercedes, Railways, etc. Already “Jatropha

Carcus" has been identified and earmarked to be the prominent source of biodiesel in the country.

- In Kolkata all three wheelers had been ordered to switch over to LPG mode from September, 2005 vide notification No. 2421-WT/3M-73/2005 dated May 24, 2005.
- Besides Delhi & Mumbai, the supply of CNG as automotive fuel has been extended to the cities of Ankleshwar, Vadodra & Surat in Gujarat and Kanpur, Bareli, Agra & Lucknow in Uttar Pradesh. As per the industry estimates the total CNG vehicles in now the country touching over 3.54 Lakh.
- Efforts for developing and popularizing electric vehicles also gained momentum during the year. Already "Reva Motors" have commercialized a small electric/battery car. Many three-wheeler manufacturers are also contemplating electric driven OEM for the Indian markets.

Other Measures

- Various traffic management options have been adopted by many cities. Governments to deal with the increasing vehicle population and to ensure smooth traffic flow. Synchronized traffic lightings with timers, bus-only lanes, parking area demarcation, etc. are few steps initiated in various metro cities of India.
- Bus Rapid Transit System (BRTS) aims at segregation of traffic in various lanes according to type of vehicles. Through BRTS, it is expected that the hindrance caused to speed of fast moving vehicles by speed of slow moving vehicles will overcome and mass transit vehicles i.e. buses will move in optimal way. In Delhi BRTS had been implemented at some of the stretches during year 2008 and it is proposed to expand in other stretches of city in a phased manner.
- Road-infrastructure development, management and by-passing of inter-state vehicles, parking restrictions, etc. are other measures being adopted in the cities. Cities like Delhi, Mumbai, Kolkata, Pune etc. have constructed many flyovers and multi-lane roads to ease traffic congestion.
- The Delhi metro line has been extended to various stretches of Delhi for catering more people thereby promoting use of mass public transport system. The metros and other mass transport systems are under various stages of implementation in other cities.
- Interstate trucks which are not destined to Delhi are not allowed to ply within the city limits.

Committees in which CPCB is a member related to vehicular pollution control

1. Standing committee on emission legislation (SCOE) constituted by MoRTH.
2. Task Force For "Introducing auditing of PUC centers" constituted by MoRTH.
3. Petroleum products sectioned committee constituted by BIS.
4. Working group on adulteration of petroleum products constituted by Bureau of Indian Standards (BIS).
5. Environmental Pollution Control Authority (EPCA) for NCR.
6. Expert committee on Auto fuel Policy constituted by MoPNG.
7. Review of Auto Fuel Policy.
8. R&D Expert Committee of IOCL, Faridabad.
9. CRRI and Indian Road Congress Expert Committee.
10. Working Group constituted by Department of Heavy Industries under Source Apportionment Studies.
11. National Natural Resource Management System (NNRMS) standing Committee on Urban Management.
12. Formulation of a Working Group to deal with old vehicles – Retrofitment of pollution control devices, Scrap policy, Inspection & Maintenance issues.

Measures Taken for Controlling Air Pollution from Industries

The measures taken for controlling air pollution from industries are summarized below:

- Emission standards have been notified under the Environment (Protection) Act, 1986 to check pollution.
- Industries had been directed to install necessary pollution control equipment in a time bound manner and legal action has been initiated against the defaulting units.
- Critically polluted areas have been identified. Action Plan have been formulated for restoration of environmental quality in these areas.
- Environmental guidelines have been evolved for siting of industries.
- Environmental clearance had been made compulsory for 29 categories of development projects involving public hearing/ NGO participation as an important component of Environmental Impact Assessment process.
- Environmental audit in the form of environmental statement has been made mandatory for all polluting industries.
- Preparation of zoning Atlas for siting of industries based on environmental considerations in various districts of the country has been taken up.

- Power plants (coal based) located beyond 1000 kms from the pit-head are required to use low ash content coal (not exceeding 34%) with effect from 1.6.2002. Power plants located in the sensitive areas are also required to use low ash coal irrespective of their distance from the pit head.

6.36 ACTION PLAN FOR CONTROL OF AIR POLLUTION IN SIXTEEN CITIES IDENTIFIED BY THE HON'BLE SUPREME COURT OF INDIA

With the objective of controlling rapidly burgeoning air pollution problems in our country, the Hon'ble Supreme Court of India, in the matter of CWP No. 13029 of 1995, passed the orders on 05.04.2001, regarding formulation and implementation of action plans for control of pollution in selected cities. The Hon'ble Court stressed the need for such initiatives relating to vehicular pollution in Delhi and directed that action plan for pollution control in the cities / towns, which do not meet the ambient air quality standards, should be prepared.

On August 14, 2003, the Hon'ble Supreme Court passed the following direction: "CPCB's report shows that the Respirable Particulate Matter (in short "RSPM") levels in Ahmedabad, Kanpur, Sholapur, Lucknow, Bangalore, Chennai, Hyderabad, Mumbai and Kolkata are alarming."

"Issue notices to the States of Maharashtra, Andhra Pradesh, Gujarat, Uttar Pradesh, Karnataka and Tamil Nadu. In the Meantime, we direct that the Union of India and the respective States shall draw a plan for lowering the rate of RSPM level in the aforesaid cities. After the plan is drawn, the same would be placed before EPCA. This may be done within a period of two months. We are excluding Mumbai and Kolkata where the respective High Courts are stated to be monitoring the RSPM levels in those cities. EPCA after examining the matter shall submit a report to this Court within a period of four weeks thereafter."

Further Central Pollution Control Board has also identified various non-attainment cities all over the country on the basis of national ambient air quality data under NAMP. Central Pollution has been coordinating with the concerned state governments of the sixteen critically polluted cities identified by the Hon'ble Supreme Court of India as well as non-attainment cities identified by itself for the preparation of action plans for control of air pollution in these cities. Further CPCB is also reviewing and monitoring the implementation of the action plans prepared for these critically polluted as well as non- attainment cities. So far State Governments of all the sixteen critically polluted cities as identified by the Hon'ble Supreme Court of India have submitted their action plan for controlling air

Pollution from all the major sources including industrial, vehicular & domestic sources. The major actions proposed for almost all the cities are as below:

Industrial Pollution

- Shifting of Industries from non- confirming zones.
- Switching over to clean technologies.
- Using clean fuels.
- Installation of Pollution control Devices.
- Development of green belt, etc.

Vehicular Pollution

- Implementation of the emission norms as well as fuel quality in accordance with the road map proposed by the Auto Fuel Policy.
- Switching over to clean alternate fuels like CNG, LPG & Bio-fuels.
- Augmentation in Public Transport system
- Better traffic management
- Implementation of fiscal measures, etc

Domestic Pollution

- Ban on open burning of garbage, biomass, etc.
- Augmentation on supply of LPG as cooking fuel, etc.

Central Pollution Control Board along with EPCA has been regularly reviewing. The action plans submitted by State Pollution Control Boards, and also monitoring its timely implementation.

6.37 AUDITING OF POLLUTION UNDER CONTROL (PUC) CENTERS IN VARIOUS CITIES/ TOWNS

Auditing of PUC centers in the cities of Kolkata, Chennai, Jaipur, Hyderabad has been taken up during year 2011 with the objective of knowing, whether adequate testing facilities with respect to new norms have been procured by all the PUC centers and also to cross check procedure and protocols followed during vehicular emission testing. Further this shall also help us identify any scope for false passes, if present in the new system. The scope of the study also include checking if the testing instruments have been certified by approving agencies and further to know the status of compliance of the vehicles with PUC norms.

* * *

CHAPTER VII

ENVIRONMENTAL RESEARCH

7.1 MICRO-FILTRATION OF SEWAGE AND RECYCLING OF FILTRATE FOR REMOVAL OF BACTERIA

A bench scale study was carried out during 12th May – 12th July, 2011 on micro-filtration of sewage effluent and recycling of the filtrate for removal of bacteria from raw sewage. Raw sewage was collected from inlet of Gurgaon STP. Micro-filtration was carried out in three phases. First the raw sewage was filtered through GFC Whatman filter paper to remove course and suspended particles from raw sewage. In second phase, the filtrate of the first phase was re-filtered through Whatman sterile membrane filter (0.45 µm) in order to remove most of bacterial population. In the third phase, filtrate was filtered through filter paper Pall Corporation (0.22 µm) to remove remaining bacteria of size more than 0.22 µm. Thus the last filtrate may contain bacteria of size less than 0.22 µm. Raw sewage was than mixed/treated with filtered sewage in 1:1 ratio and the reduction in Total and Fecal coliform was observed. The results indicated antagonistic activity of bacteria and their bacteriophage in raw and filtered sewage and treated sewage.

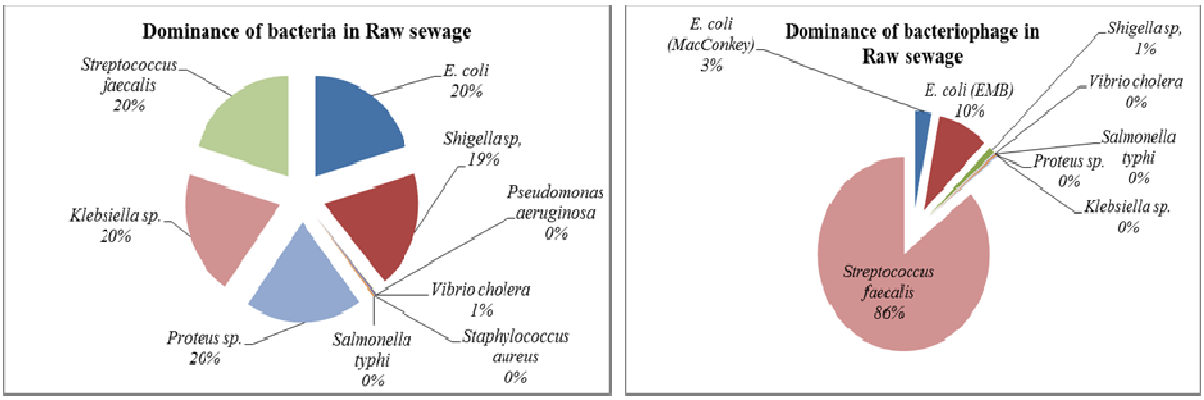


Figure 7.1 : Dominance of Bacteria and Bacteriophage in raw sewage

- Raw sewage contained maximum dominance of E.coli, Proteus sp., Klebsiella sp., Streptococcus faecalis and Shigella sp. in equal proportions.
- Raw sewage of inlet of Gurgaon STP contained dominance of bacteriophage of Streptococcus faecalis.

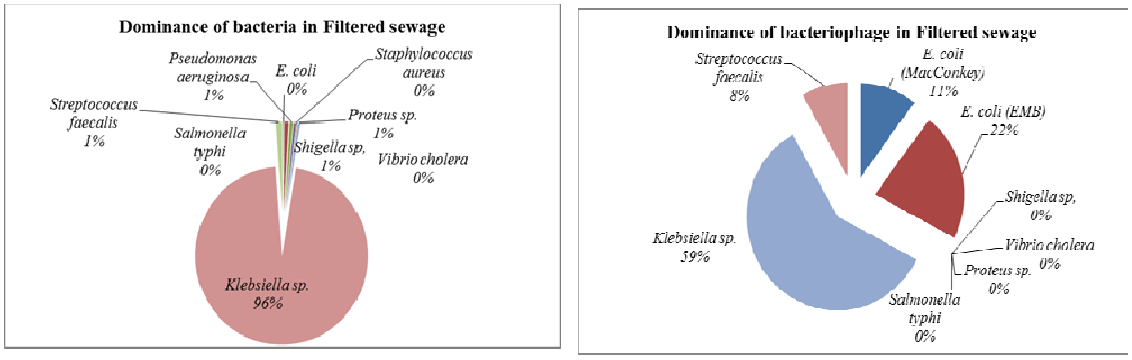


Figure 7.2 : Dominance of Bacteria and Bacteriophage in Filtered sewage

- Filtered sewage contained dominance of Klebsiella sp. compared to E.coli, Proteus sp., Streptococcus faecalis and Shigella sp. Dominance of Klebsiella sp. in filtered sewage indicated its size less than 0.22 µm among all the bacteria.
- Filtered sewage contained dominance of bacteriophages of Klebsiella sp.
- Total Coliform reduced in number in filtered sewage.

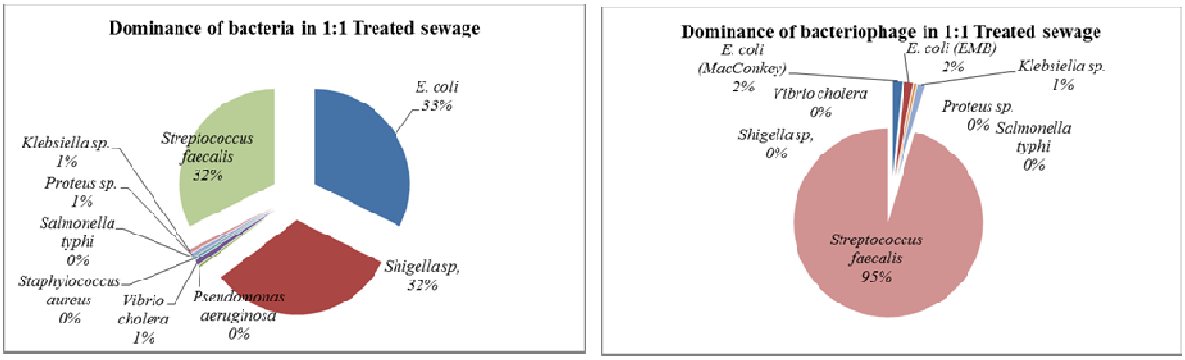


Figure 7.3 : Dominance of Bacteria and Bacteriophage in 1:1 Treated sewage

- Treated sewage contained dominance of E.coli, Shigella sp. and Streptococcus faecalis in equal proportions.
- Treated sewage contained dominance of bacteriophage of Streptococcus faecalis.
- Fecal Coliform reduced in treated sewage.

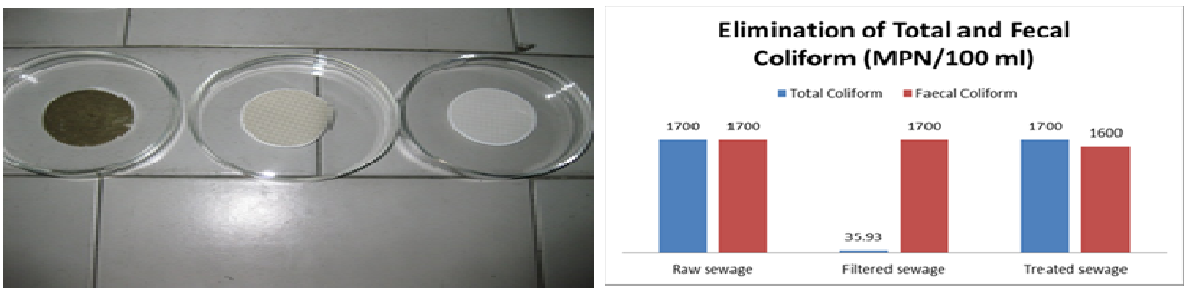


Figure 7.4 : Removal of suspended particles and bacteria during three phase micro-filtration of raw sewage

7.2 SALTLESS PRESERVATION OF HIDES/SKINS BY LYOPHILISATION TECHNIQUE

Based on laboratory scale study at Central Pollution Control Board, Delhi, a Lyophiliser plant was established at Kanpur and a field-scale study on salt-less preservation of hides/skins was undertaken to evaluate the efficacy of the lyophilisation technique for hides/skins preservation. The plant was established adjacent to the premises of the Common Chrome Recovery Plant near the 36 MLD Common Effluent Treatment Plant at Jajmau, Kanpur.

Subsequent to establishment of the Lyophiliser plant, Central Pollution Control Board Zonal Office Lucknow carried out the demonstration of salt-less preservation of hides/skins using the lyophilisation technique. In order to spread awareness about application of Lyophilisation technique for hides/skins preservation, Central Pollution Control Board organised an Awareness Programme on 19.06.2011 in Kanpur at the plant site. The programme was inaugurated by Hon'ble Minister of Environment and Forests, Govt. of India and attended by approximately 200 participants representing tanneries, slaughter houses, goverment institutions and other academic institutions.

Lyophiliser plant at Kanpur - An actual site view

Inauguration of Awareness Programme by the Hon'ble Minister of Environment and Forests, Govt. of India

A training programme for operation of Lyophiliser was also organized during October 13-14, 2011. The training was attended by representative of slaughter house, UPPCB, and CPCB. Plant manufacturer explained the instrumentation and operational aspects of the Lyophiliser and verifying actual operation of different units of the Plant.

CPCB Zonal Office, Lucknow carried out field scale studies on the Lyophiliser during the period of 4 months. Four batches each of 3 buffalo hides were freeze-dried in the lyophiliser. The freeze dried hides were got processed in tanneries and comments received from tanneries so as to further tune the operation.

The lyophiliser was operated on different loading varying from 60 to 70 kg total hides loading, moisture/weight loss 50-60% and final moisture content varying from 30 to 40% and drying time 5-9 hrs. The other process and stage-specific observations as received from different tanneries are summarized below :

Table 7.1 : Summarized observations on processing of hides in tanneries

Processing of Lyophilised Hides	Processing of Salted hides
Stage: Hide Receipt in tannery	
Moisture Content 40 %	Moisture Content 60 %
Stage : Soaking	
Due to saltless curing in first pre-soaking operation the surface swelling was done in excess and, therefore, due to constriction of capillaries in hides no further water had penetrated on account of which hides could not re-hydrate properly even after 60 hrs. Due to the hides being dry its interfibrally substances coagulated and hard cementing substances were formed on account of which the separation of fibres from each other during soaking operation could not be done	Normal Soaking noted in 16 hrs. The hides were found completely re-hydrated and contracted fibrous structure was properly opened
Stage: Liming	
Hides did not have the same amount of	It was noted that Keratinous matter

Processing of Lyophilised Hides	Processing of Salted hides
plumping and swelling as in case of salted hides, alike the other hides. They were not properly swelled up, nor coagulated fibres splitted up / opened up to the desired extent, fat layer found on flesh side which did not dissolve in liming operation, conditioning of collagen was not done properly. Complete and proper conditioning of collagen of lyophilized hides could not be done.	has been properly removed, properly swelled up and coagulated fibres splitted up / opened up to the desired extent, fat contents on flesh side of hides removed, and proper conditioning of hides collagen has been done. It was also observed that loosening of hair is proper, grain side of both the hide pieces were found clean in which no putrefaction or bacterial spores were seen.
On observing the limed lyophilized hide pieces it was also found that there were frost bite / putrefaction like mark on the grain of hides all around. It is possible that this frost bite may be due to water contents within the raw hides which after crystallizing / freezing has given effect on hides. **As the selling of collagen is also one of the important factors which after liming operation is swelled upto desired extent and its degree of swelling is observed in terms of amount of water taken up in hides. In the liming process of these hides water consumption has been 120% of the hide weight. Less water consumption was due to non-swelling of hide properly in lyophilized hide pieces**	In salted raw hides water consumption was 150% of the hide weight.
Stage : De-liming	
It has been observed that in deliming operation of saltless (lyophilized) hide pieces the consumption of water, chemical and time taken were high	The consumption of water, chemical and time taken were normal.
Stage : Tanning (Chrome)	
In cross section of salt less lyophilized hide pieces chromium tanning was not properly found	Chromium tanning was found proper

Characteristics of process specific wastewater resulting from processing of Lyophilised and Salted hides was also compared. Characterization of process specific wastewater is summarized as under:

Table 7.2 : Results of Wastewater Characterization (Process stage-wise)

Stage of Processing	pH	TSS	TDS	Cl	SO_4	COD	BOD	Total-Cr
Effluent of Pre-soaking Buff (Salt Free)	10.83	60	2498	5.6	272	627	260	-
Effluent of Soaking Buff (Salted)	7.45	1298	38843	29249	1252	3516	1451	-
Effluent of Liming Buff (Salted)	13.6	4686	11359	2584	2233	2610	962	-
Effluent of De-Liming Buff First Wash (Salted)	8.94	455	3328	1089	1641	624	475	-
Effluent of De-Liming Buff Second Wash (Salted)	8.87	187	2008	495	1534	262	198	-
Effluent of De-Liming Buff (Salted)	8.84	1181	13069	1485	6990	2532	983	-
Effluent of Soaking Buff (Salt Free)	8.18	1354	2193	665	694	5550	2600	-
Effluent of Liming Buff (Salt Free)	13.76	3760	7159	7.92	1796	5790	4358	-
Effluent of Pickling Buff (Salted)	1.58	703	48898	19018	11189	2540	675	-
Effluent of Pickling (Salt Free Buff)	2.94	1704	52523	16382	18102	1910	414	-
Effluent of Deliming (Salt Free Buff)	9.16	855	13562	798	2920	1593	491	-
Effluent of Tanning after Basification (Salt free buff)	4.81	1350	18435	3710	11250	1036	89.5	614
Effluent of Deliming, 2nd Wash (Salt free Buff)	9.02	138	1885	359	1934	88.8	38.2	-
Effluent of Tanning after Basification (Salted buff)	4.80	905	13299	386	6250	1003	96.9	244
Effluent of Deliming, 1st Wash (Salt Free	8.81	67	4502	1174	6185	103	56.5	-

Stage of Processing	pH	TSS	TDS	Cl	SO_4	COD	BOD	Total-Cr
Buff)								
Effluent of Prewash (Wet Back) Salt Free Buff	5.26	709	4264	1211	1685	656	198	-
Effluent of Re-Chroming Salt Free Buff	3.18	430	27739	1720	18843	5910	2832	-
Effluent of Neutralisation Salt Free Buff	7.13	494	26829	836	19861	3656	1169	-
Effluent of Fixing Salt Free Buff	3.09	4972	48598	2399	30370	42283	19069	-
Effluent of Prewash (Wet Back) Salted Buff	4.61	519	4070	761	11759	449	172	-
Effluent of Re-Chroming Salted Buff	3.34	860	30472	636	15324	12240	4550	-
Effluent of Neutralisation Salted Buff	7.12	648	37889	992	29074	13750	5950	-
Effluent of Fixing Salted Buff	3.24	2262	38461	1560	25833	47000	26350	-

Note: All values except pH are in mg/l

7.3 PILOT PLANT STUDY USING SLUDGE-REAGENT-PRODUCT (SRP) TECHNOLOGY

An innovative technology called "Sludge-Reagent-Product (SRP) Technology" had been developed by Central Pollution Control Board with an aim to recover the alum in the sludge used for treatment of water Adoptions of this technology indeed yielded 80 to 90% recovery of chemical coagulant (alum) from discarded alum-treated-sludge for recycling and reuse. The substitute of fresh alum with the recovered alum in the tune of 90-95% for treating the water increased eco-efficiency with both economic and environmental benefit as reflected from the saving of Rs. 550 million per year and reduction of sludge to the tune of 60 - 70% to be discharged. The volume of sludge is reduced by removing the moisture from the sludge (thickener). In sludge, moisture content is almost 20 percent of the treated water used for the treatment. The about 80 % of total moisture is removed from the sludge and that is used for drinking purpose. Removal of moisture makes the sludge handing more convenient. Finally the study focused a number of opportunities in waste minimization and pollution prevention areas aimed a sustainable development.

The treatment technology entitled "An Integrated Plant for Treatment of Raw Water Using Discarded Sludges to Produce Drinking Water" has been patented vide Indian Patent No. 215808, Filed in April 2001 and Granted received March 2008. The study integrates the waste of treatment plant in Delhi in such a way that sludge of their treatment plant becomes raw material. This utilization indeed yielded increased eco-efficiency with economic and environmental benefit as well as prevented pollution of environmental component. The evolved technology consumption has been reduced upto 95%.

During the year, the construction work for 0.5 MLD pilot water treatment plant, based on SRP technology at Bhagirathi Water Works (Delhi Jal Board), Yamuna Vihar, Delhi has been completed. The pilot plant is now ready for demonstration of SRP technology.

7.4 SCIENTIFIC RESEARCH PAPERS PUBLISHED DURING YEAR 2011-2012

1. Distribution of Pesticides in Sediments from Municipal Drains in Delhi, India. *Asian Journal of Scientific Research, 2011, 4 (3): 271-280*
2. Distribution of Polychlorinated Biphenyls in Agricultural Soils from NCR, Delhi, India. *Annals of Biological Research*, 2011, 2 (3): 247-254
3. Residues of Pesticides and Herbicides in Soils from Agriculture Areas of Delhi Region, India. *Journal of Environment and Earth Science, 2011, 1(2):1-8.*
4. Hexachlorohexane (HCH) & Dichloro-di-methyl-tri-chloroethane (DDT) in soils from Northern Uttar Pradesh, India. *European Journal of Experimental Biology, 2011, 1 (3):162-168*
5. Persistent Organochlorine Pesticides and Polychlorinated Biphenyls in Intensive Agricultural Soils from North India. *Soil & Water Research, 2011, 6(4): 190–197*
6. Determination of Pyrethroid Insecticides by Reversed Phase High Performance Liquid Chromatography-Diode Array Detector (HPLC-DAD) with Different Types of Column. *Proceedings of Indian National Science Academy, 2011, 70 (1):51-55.*
7. Polychlorinated Dibenzo Dioxins (PCDDs) and Furans (PCDFs) In Contaminated Soil, Sewage Sludge, Paper Mill Sludge And Fly ash. *Organohalogen Compounds, 2011, 73, 1842-1846.*
8. Distribution and Ecotoxicological Risk Assessment of Persistent Organic Pollutants (POPs) In River Sediments from Delhi, India. *Advances in Life Science and Technology, 2011, 1:1-13.*
9. Polychlorinated Biphenyls in Soils from Cropland Areas of North India. *Organohalogen Compounds, 2011, 73:1900-1903*

10. Residues of Persistent Organochlorine Pesticides in Soils from Variable Cropping Pattern Agriculture Areas. *Organohalogen Compounds, 2011, 73:1851-1854*
11. Distribution, Composition Profiles and Source Identification of Polycyclic Aromatic Hydrocarbons in Roadside Soil of Delhi, India. *Journal of Environment and Earth Science, 2012, 1:10-22.*
12. Distribution of Polychlorinated Biphenyls in Surface Waters of Various Sources from National Capital Region Delhi India. *Journal of Natural Sciences Research, 2012, 1:26-37.*
13. Contamination by Polychlorinated Dibenzo-p-dioxins (PCDDs) and Dibenzo-p-furans (PCDFs) in Selected Solid Wastes: An Implication of Potential Sources of Pollution. *Advances in Applied Science Research, 2012, 3 (2):1045-1051*
14. Dioxin-Like Polychlorinated Biphenyls in River Sediments. *Advances in Applied Science Research, 2012, 3 (2):1012-1019*

7.5 LIFE CYCLE ASSESSMENT OF CEMENT PLANTS BASED ON ALTERNATE FUELS

Life Cycle Assessment (LCA) is fast emerging environmental management tool adopted worldwide, to identify priorities for improvements in process operations, product design, alternative fuel and product substitution to meet the twin objectives of optimal resource utilization and sustainable development. Ministry of Environment and Forests (MoEF), Govt. of India has taken initiatives to carry out LCA studies in major sectors like Steel, Coal, Paper and Cement Sector. Under aegis of MoEF, NCB has completed LCA study for cement sector recently. Growing awareness of the problems of pollution and constantly improving technologies have led to progressively lower the emission limits. However, there is lot of scope for use of alternate fuels/raw materials in cement manufacture to improve resource conservation.

The opportunities for minimizing the resource use and emissions are being harnessed in the cement industry at present, by a few units on trial basis. These practices/advantages and evaluation at unit operations level requires detailed investigations to identify the hot spots for further environmental improvement, such opportunities include use of alternate raw materials and fuels and its impact on global, regional and local environment in terms of global warming potential (GWP), acidification potential (AP), Resource conservation (RC), Land Use (LU), Dust generation etc. Using LCA tool, this study will demonstrate the environmental benefits that alternate fuel can deliver to a cement plant. This study will focus on reduction of GHG and energy burden by improving energy efficiency by substitute fuels used in cement plant. Cement plant can play a valuable role in maximizing

the utilization of waste material and providing an environmentally beneficial alternate fuel for the industry. The study has been awarded to NCBM, Ballabgarh which is in progress.

7.6 BIO-CONTROL OF OPPORTUNISTIC PATHOGENIC BACTERIA IN WASTEWATER BY HOST SPECIFIC BACTERIOPHAGE

Bacteriophage has been effective against a wide variety of pathogenic bacteria as they are highly host specific. The host specificity of viruses offer an enticing technology for fighting infections caused by bacteria and now there is an increased interest for the treatment of environments contaminated with pathogenic bacteria using phage mediated bio-control. Potential use of viral therapy on treatment of environments contaminated with pathogenic bacteria is limited, but studies have shown success using this technology to treat infections in livestock, plants, aquaculture and humans.

The use of phage in the treatment of bacterial infection is an attractive alternative to existing broad–spectrum antibiotics, where phage target a particular host and are unlikely to illicit resistance in untargeted bacterial strain. Also, unlike chemical therapeutic agents, phages are not susceptible to the onset of resistant bacterial strain because they have the ability to evolve with their host. Now, phage therapy has been considered as an important alternative to antibiotics for treating multidrug resistant pathogens.

Bacteriophages are widely distributed in the environment and can be isolated from sea water, soil, fresh water and sewage ecosystem. The prevalence of large population of pathogenic bacteria existing in close proximity in sewage water makes it a relevant source for the isolation of the various bacteriophages. Bioscience division of CPCB Zonal laboratory, Bangalore has done several short studies on the isolation of host specific bacteriophages and demonstrated the potential bio-control effect of phages in lab scale simulated microcosms.

Several host specific bacteriphages were isolated from the sewage systems and a small culture collection of phages and their specific bacterial host has been maintained. Efficacy of host specific bacteriophage has been demonstrated against *Salmonella spp.* in a lab scale sewage microcosm. This R&D work is being carried out as a part of short term student's project/dissertation and four postgraduate students have been imparted trainings. Though the studies proved to be promising more in-depth studies are required to validate the potential application of phages as bio-control agents against pathogenic bacteria in waste water systems.

Figure 7.5 :Clearing of culture broth due to phage mediated killing

Figure 7.6 : Microbiology lab

Figure 7.7 : Clear zones due to phage mediated killing of host bacterium

7.7 OPTIMISING SAMPLING UNCERTAINTY

Monitoring is the important activity that environmental scientists and enforcement agency undertake to document status, changes and trend of river water quality. This programme is not just a mere data collection exercise. It aims to fulfill objectives defined for water resource management. Scrutinization of available data and field experience clearly revealed significant measurement error in many cases. During measurement, both sampling and analytical procedure contribute to errors in analytical results. Sampling error mainly originates from unsuited sampling design that did not represent the population of interest well enough. In recent years, there has been renewed emphasis on the idea that sampling is the part of the measurement process rather than a separate activity of little relevance to the analyst as recommended by Analytical Methods Committee (AMCTB 40, 2009). Estimation of uncertainty in both sampling and analysis demands wide attention all over the world. Though protocol of QA/QC is implemented in many laboratories to minimize analytical error, but error originating from sampling remains elusive. Decision makers always need this information to support a decision, whether results can be used for compliance study or any other purpose. Therefore

laboratory must provide the analytical results with its uncertainty. For sampling in any river, uncertainty may usually arise from various factors such as heterogeneity, temporal domain, container cleanliness, transportation, subsampling, preservation points at water column, etc in the same location.

Since it is difficult to perform perfect sampling from any water body particularly for measurement of BOD, COD, TSS, TKN, NH_3-N, PO_4-P etc. and thereby influences of the above factors cannot be ruled out even after taking best possible measures to minimise the errors. As a result, successive samples from the same target differ in composition. Therefore an emergent need is to estimate the magnitude of uncertainty in a measurement process. Estimating of uncertainty of each component is not feasible. For estimating uncertainty due to sampling and analysis, a simple and cost-effective method of estimating the sampling uncertainty is duplicate method as advocated by Ramsey and Ellison, 2007 and in Eurachem/CITAC guide.

Considering above, this duplicate method is applied for estimating measurement uncertainty (MU) of BOD, COD, Total hardness, Alkalinity, and Calcium to document the status of changes and trend of water quality. This method uses replicate sampling and analysis to estimate the separate contributions to the measurement uncertainty from the sampling and analytical processes. It generates estimates of sampling variability and the analytical repeatability, which are the random components of the measurement uncertainty. Before collecting the samples, sampling protocol have been framed to minimize the influences of various factors on sampling error as defined earlier. The sampling targeted in this study was eight locations in river Hugli identified under NWMP. Eight duplicate samples were collected to ensure that the resultant uncertainty estimates are reasonably precise. Both duplicate primary samples are subsampled into two and two test portions are taken from each. The test portion are then analysed using recommended analytical methods. With due emphasis on implementation of QA/QC, the assembled analytical results were processed by using Robust ANOVA.

Table 7.3 : Assembled Analytical Results

Parameter	Geochemical Variance	Sampling		Analysis		Measurement	
		Var	RU	Var	RU	Var	RU
Alkalinity	65.3	0	0	30.7	9.1	34.8	9.6
Calcium	62.6	3.9	0	37.4	14.6	37.4	14.6
COD	77	0	0	22.9	28.2	22.9	28.2
Hardness	92.3	3.2	4.7	4.5	7.2	7.7	7.2
BOD	66.1	0	0	35.0	33.0	35.0	33.0

Var – Variable (%), RU – Relative uncertainty (%)

The outcome of Robust ANOVA shown in the Table revealed that measurement uncertainty of BOD, COD, Hardness and Alkalinity have reached to 35%, 28.2%, 7.2%, 9.6% and 9.6% respectively. Their uncertainty is mainly originated from analytical part. It is interesting to note that appropriate sampling with all possible care minimize the sampling uncertainty to zero in case of Calcium and COD though expectation of zero uncertainty is mere coincidence. But the prevailing analytical uncertainty in Calcium, Alkalinity and Hardness by Titrimetric method with the 10% magnitude is acceptable though analytical uncertainty of calcium exceeded 10% that needs attention. Root cause analysis was performed and corrective action has been taken. Analytical performance will be verified during forthcoming sampling campaign. The magnitude of analytical uncertainty in case of BOD and COD was close to 30%. The possible reason is that detection capabilities of recommended methods are not adequate to determine BOD at 1.5 mg/l and COD at 10 mg/l. Since detection capabilities are important performance characteristics of analytical procedure, correction action can be taken based on some conceptual approaches on the above aspect. Based of available literature, Central Pollution Control Board Zonal Office Kolkata has undertaken a programme for modeling measurement uncertainty along a concentration interval defined from the estimated concentration of blank to the highest considered concentration particularly for BOD and COD.

7.8 ASSESSMENT OF VEHICULAR POLLUTION PROBLEMS AND DEVELOPMENT OF AIR QUALITY MANAGEMENT PLAN IN RELIGIOUS & TOURIST PLACES

A study on “Assessment of vehicular pollution problems and development of air quality management plan in religious (Haridwar) & tourist (Mussorie) places” was taken up in collaboration with Pollution Control Research Insitute (PCRI), BHEL, Haridwar. The study has since been completed and has also covered Kumbh Mela held at Haridwar during Jan-April 2010. The study report is under publication.

7.9 ASSESSMENT OF ALDEHYDES, KETONES AND METHANE EMISSIONS IN VEHICLE EXHAUST, USING DIFFERENT FUELS (PETROL, DIESEL, LPG, CNG, ETHANOL IN PETROL, BIODIESEL AND HYTHANE)”

This study was awarded to International Centre for Automotive Technology (iCAT), Manesar with the objective to characterize Aldehydes, Ketones and Methane emissions in vehicle exhaust of 2-wheelers, 3-wheelers, 4-wheeled passenger vehicles, 4-wheeled Light duty commercial vehicles & 4-wheeled Heavy duty commercial vehicle engines operating on different fuels i.e. Petrol, Diesel, LPG,

CNG, Ethanol (5%) in Petrol (BS III) and Biodiesel (10%) in Diesel (BS III) & Hythane. The project has been completed and its report is under finalization.

7.10 INVENTORIZATION OF RAILWAY SIDINGS AND GUIDELINES FOR THEIR ENVIRONMENTAL MANAGEMENT

The study on Inventorization of Railway sidings and development of guidelines for their environmental management has been taken up by Central Pollution Control Board subsequent to large number of public complaints related to railway sidings. This study has been awarded to RITES Limited, Gurgaon. The Objectives of the study involves Inventory of all major railway siding (Railway yards, ports, mines etc.), and development of guidelines for Environmental Management of Railway sidings.

7.11 STATUS OF THE POLLUTION GENERATED FROM ROAD TRANSPORT SECTOR IN SIX CITIES

The study involves Development of emission inventory of vehicular sources in six mega cities namely Hyderabad, Kolkata, Ahmadabad, Patna, Lucknow & Sholapur during first phase, Estimation of total vehicular emission loads (both tail pipe as well as evaporative emissions) in the selected cities/towns and estimation of contribution of different categories (2 wheelers, 3-wheelers & 4 wheelers like cars, LCV, HCV, etc.) of vehicles towards total vehicular emission load and identification of vehicle category contributing most towards total emission load from vehicles. This study has been awarded to TERI during the year 2011. More cities are likely to be covered in the next phase.

7.12 DEVELOPMENT OF GUIDELINES FOR THE ENVIRONMENTALLY SOUND RECYCLING / DISPOSAL OF ELVS (END OF LIFE VEHICLES)

This is an In-house study aiming at developing guidelines for environmentally sound of ELV's through Inventorization and Categorization of different End of Life vehicles, details on various materials used in manufacturing of vehicles, LCA (Life Cycle Assessment) of different components of vehicles, estimation of generation of waste in terms of tons/annum from yearly and development of guidelines for recycling/disposal of used vehicles.

7.13 PERFORMANCE AUDITING OF ENVIRONMENT MANAGEMENT IN "INDIAN RAILWAYS STATIONS, TRAINS AND TRACKS"

The study has been undertaken in-house by Central Pollution Control Board, Delhi in collaboration with its Zonal Offices. CPCB received letter from Principal Director of Audits, Indian Railways, wherein it has asked CPCB to carry out

performance audit of various environment management steps taken up by Indian Railways for controlling pollution. This study covered monitoring and evaluation of measures taken by the Railways for controlling pollution of air, water and noise in station premises /sidings/sheds. Six Zonal offices of Central Pollution Control Board carried out study in the Railway Zones coming under their jurisdiction. The final compiled report of this study has been sent to Indian Railways.

7.14 ASSESSING THE VEHICULAR DENSITY IN SHILLONG

Shillong, the capital city of Meghalaya has witnessed an extremely high increase in the vehicular traffic density in recent times. This, together with the small and narrow roads, which are characteristics of city, has resulted in severe traffic congestions. Shillong is also not connected by railways and therefore, all movements have to be via road. Moreover, Shillong does not have a highway bypass and therefore, all the vehicles, which consist mostly of trucks, passes though the city. The Central Pollution Control Board has undertaken study to assess vehicular density in various parts of city to suggest various remedial measures.

A preliminary survey was conducted to identify hotspots i.e., points with high vehicular traffic congestion/ movement. Monitoring of vehicular density has been conducted at regular intervals at the identified hotspots. The monitoring conducted in the year 2011 is presented in Tables 7.4 to 7.6.

Table 7.4: Monitoring of vehicular Traffic density at Shillong

Sl. No	Station	Number of Monitoring	Monitoring Duration
1	Jhalupara	Three	24 hours
2	Madanriting	Two	24 hours
3	Dhankheti	One	12 hours

Table 7.5 : Monitoring of vehicular Traffic density at Jhalupara, Shillong

Date of Sampling	Two Wheelers	Petrol Driven Cars	Diesel Driven Cars	Light Duty Vehicles	Trucks and Busses
21/06/2012	5055	9208	979	4545	6682
22/07/2011	4207	12053	735	3344	3244
05/08/2011	3997	16404	965	4261	4478

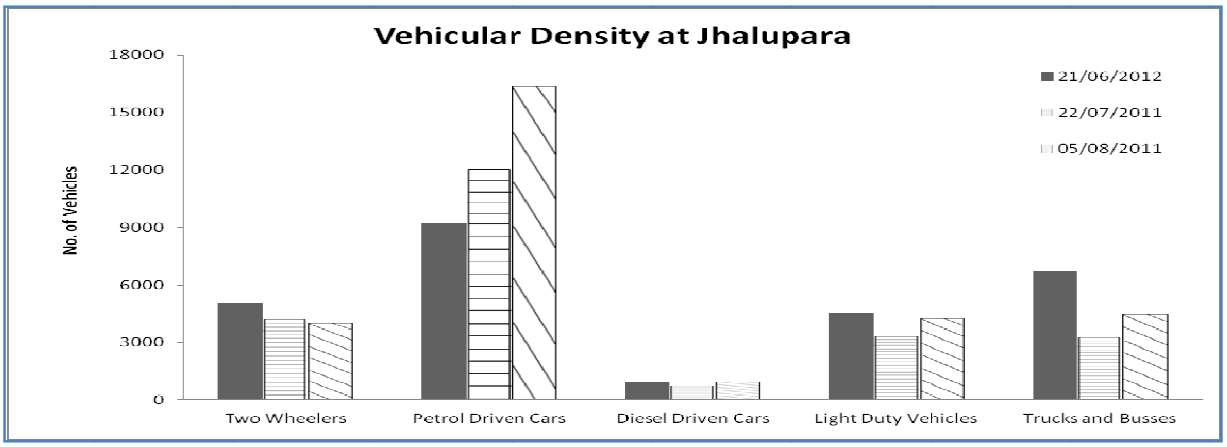


Figure 7.8 : Vehicular Density at Jhalupara

Table 7.6 : Monitoring of vehicular Traffic density at Dhankheti, Shillong

Monitoring Date	Two Wheelers	Petrol Driven Cars	Diesel Driven Cars	Light Duty Vehicles	Trucks and Busses
28/07/2011	5590	23546	790	4376	5595

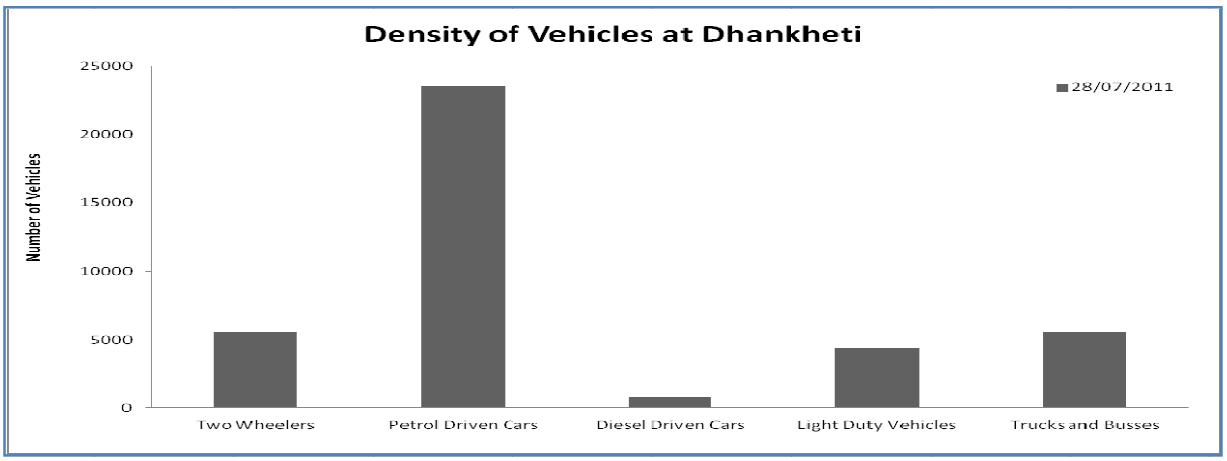


Figure 7.9 : Density of Vehicles at Dhankheti, Shillong

Table 7.7 : Monitoring of vehicular Traffic density at Madanriting, Shillong

Monitoring Date	Two Wheelers	Petrol Driven Cars	Diesel Driven Cars	Light Duty Vehicles	Trucks & Busses
13/06/2011	2493	7913	762	2295	6352
13/07/2011	2917	11336	874	5777	5615

The key findings indicated that there are high traffic congestions at all these spots. Vehicular congestion/movement are higher during working days as compared to off days. Petrol driven cars, usually driven as taxis is the most driven vehicle.

Trucks and busses are more frequent in national highways passing then in other parts of the city.

7.15 IONIC PROFILE OF RSPM IN AGRA

Central Pollution Control Board, Project Office, Agra has undertaken investigations of characterization of Particulate Matter with reference to Cations, Anions, Organic fraction analysis and metal analysis etc. These analyses along with characterization of rain water samples have been carried out to assess possible sources of air pollution in the region. .

Characterization of PM_{10} has been carried out to assess ionic composition and contribution in particulate matter. Ionic trend of PM_{10} at Agra during year 2011-12 has been presented in Figure 7.10. Among the analysed ions, Cl^-, NO_3^- and SO_4^{--} were found in higher concentration in comparison to other analysed ions, however, minimum level of F^- and Mg^{++} ions were detected.

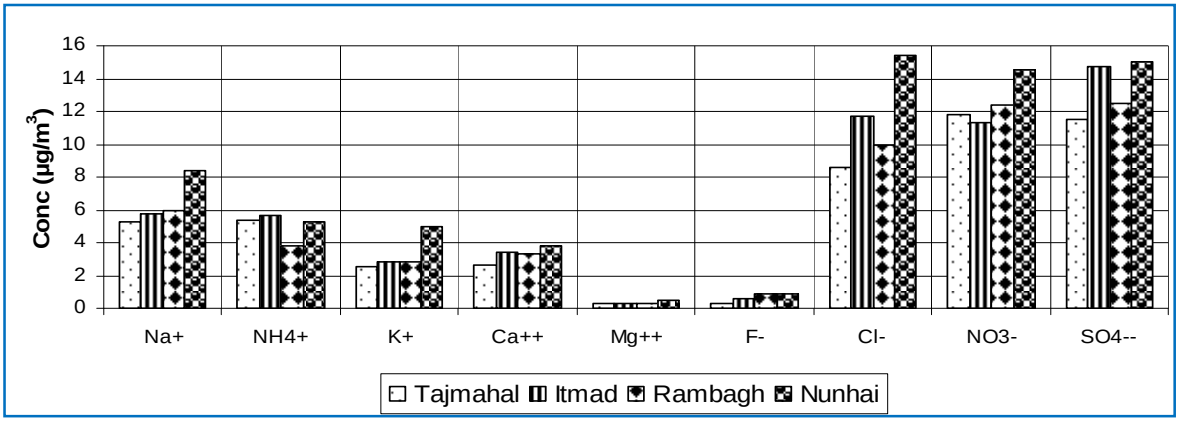


Figure 7.10 : Ionic Trend of PM_{10} at Agra during year 2011-12

Average level of Mg^{++} determined at Taj Mahal was minimum, on the other hand average level of Cl^- at Nunhai monitoring station was detected highest among all. On the basis of total ionic load, Nunhai shares maximum among all four monitoring stations however Tajmahal received least ionic load. On the basis of ionic contribution, Cl^- contributed maximum i.e. 19% (highest) to the ambient air of Agra, while F^- & Mg^{++} both the ions shared minimum i.e. 2% each. The trend of ionic contribution in decreasing order is as follows:

$$Cl^- > SO4^{--} = Na^+ > NH_4^+ > NO_3^- > Ca^{++} > K^+ > F^- = Mg^{++}.$$

The ratio of the annual sum of cations and anions at Tajmahal was 1.21, Etmad-ud-daulah 1.18, Rambagh 1.16 and at Nunhai was 1.20, which clearly indicates the alkaline nature of ambient air particulate pollutants (PM_{10}~ RSPM) in Agra.

7.16 TOLUENE SOLUBLE ORGANIC FRACTION (TSOF):

In order to find out the levels of soluble organic fraction in Respirable Suspended Particulate Matter (PM10), the study of Toluene Soluble Organic Fraction (TSOF) has been carried out by Central Pollution Control Board in Agra city during the year. Results indicated that TSOF in RSPM during the year 2011-12 at Tajmahal ranged from 02 - 21 % with average of 12% in RSPM. At Rambagh monitoring station average value of TSOF was found 15% with the range between 07 – 22%.

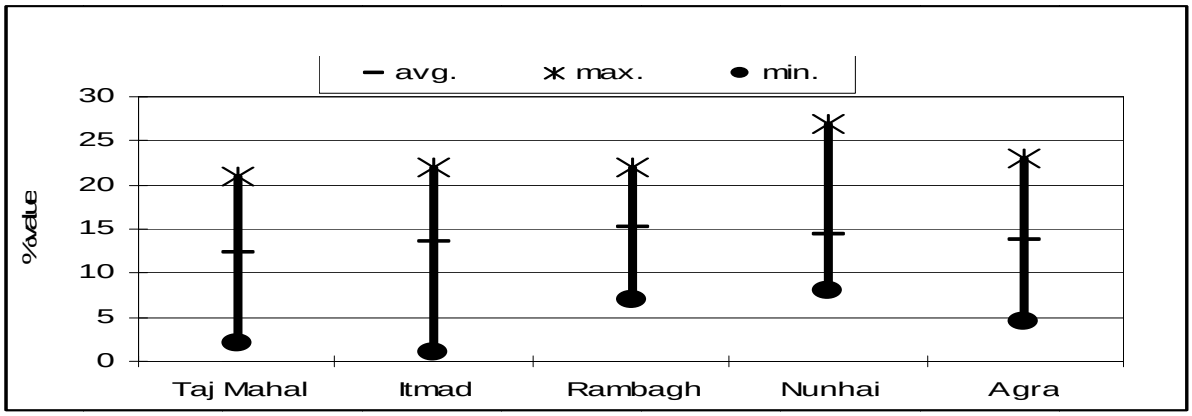


Figure 7.11 : Percentage TSOF (in RSPM) in Agra during year 2011-12

At Etmad-ud-daulah AAQM station, average TSOF value was detected 14% (range 01 - 22%) while Nunhai monitoring station shared TSOF 14% with the range from 08 - 27%. The average TSOF % fraction at Agra ranged between 05 – 23% with annual average of 14%.

7.17 INDOOR AIR QUALITY STUDY IN AGRA:

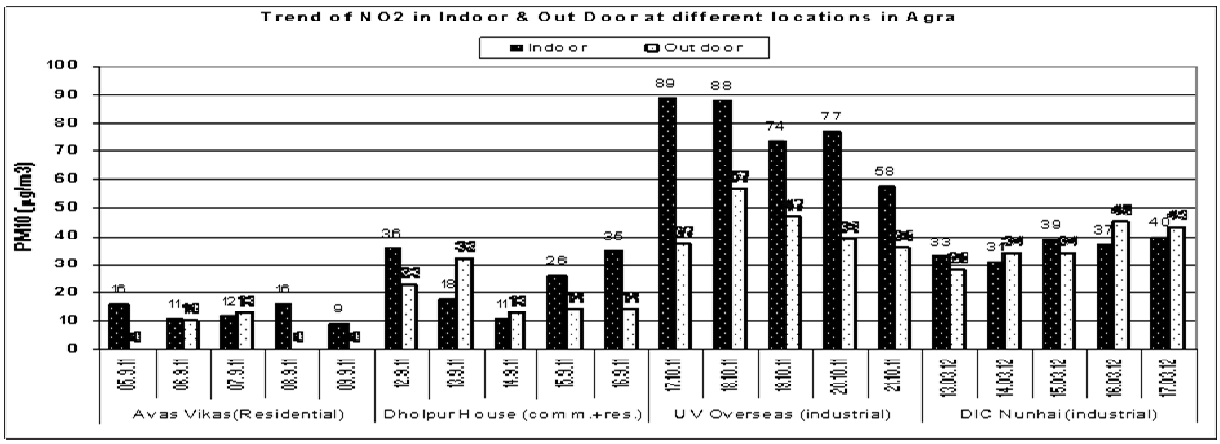


Figure 7.12: Trend of NO_2 in indoor & out door at different locations at Agra

During year-2011-12, an indoor air quality monitoring was initiated by Central Pollution Control Board Project office, Agra at selected locations to know the characteristics of indoor air quality and comparison with outdoor ambient air quality. In continuation of above mentioned study, four locations were selected viz. Avas Vikas (Residential), Dholpur House (Commercial) and two industrial sites i.e. UV Overseas and DIC Nunhai in Agra city. At these locations RSPM, NO_2 and SO_2 parameters were monitored simultaneously in indoor & out door both ambient air.

Results indicated that the level of PM_{10} in outdoor ambient air was generally higher than the level of indoor ambient air at all locations except Dholpur house. Indoor level of PM_{10} at Dholpur house was found higher than the outdoor level of PM_{10} of same location may be due to same indoor generation of dust.

7.18 CHARACTERIZATION AND SIZE DISTRIBUTION OF AMBIENT PARTICULATE MATTER IN BHOPAL:

Various air pollutants like PM, RSPM ($PM_{2.5}$ & PM_{10}), NO_x, SO_2,CO,O_3, NH_3, lead, benzene, B(c)P, Arsenic, Nickel, dioxins, furan are introduced into the atmosphere by human & industrial activities. Exposure to heavy metals and organic pollutants can cause an impact on human health and may leads to ecological damage. The composition of SPM is vital to assess its impact on environment and human health. Hence the characteristics of PM_{10} & $PM_{2.5}$ at Bhopal & Jabalpur cities of Madhya Pradesh were studied with by Central Pollution Control Board, Zonal office, Bhopal respect to heavy metals, cations & anions. Samples for $PM_{2.5}$& PM_{10} at four locations each in Bhopal & Jabalpur representing residential, commercial & industrial locations were collected on Teflon filter papers for 24 hour basis during January 2012.

The $PM_{2.5}$ & PM_{10} samples were analyzed through EDXRF (Energy Dispersive X-Ray Fluorescence) at Central Pollution Control Board, Delhi for Laboratories 41 elements (32 metals, 5 non-metals & 4 Metalloids) through non-destructive method.

Table 7.8 : PM_{10} Characterisation BHOPAL CITY

Parameters	Sampling locations			
	North T T Nagar	Saket Nagar	CETP Govindpura	Sharda Vihar
	Commercial	Residential	Industrial	Reference
Total PM_{10}(µg/m³)	84.14	80.72	99.30	70.06
Levels of 41 Elements				
Metals (µg/m³)	23.382	33.474	44.794	14.727
Non-Metals (µg/m³)	34.038	46.143	51.224	24.226

Parameters	Sampling locations			
	North T T Nagar	Saket Nagar	CETP Govindpura	Sharda Vihar
	Commercial	Residential	Industrial	Reference
Metalloids (µg/m³)	NIL	0.02034545	0.04445969	NIL
Total Conc (µg/m³)	57.420	79.723	96.018	52.871
% of 41 Element w.r.t. Total PM_{10}	68.244	98.766	96.695	75.462
Major Elements (µg/m³)				
Si	23.511	35.083	38.156	14.571
S	7.849	7.965	7.837	7.550
Ca	9.643	15.159	13.694	5.369
Fe	8.816	11.831	20.803	5.543

Table 7.9 : $PM_{2.5}$Characterisation BHOPAL CITY

The weather was found clear	The weather was found clear			
	The weather was found clear	Saket Nagar	CETP Govindpura	Sharda Vihar
Total $PM_{2.5}$(µg/m³)	60.71	46.62	59.31	44.16
Levels of 41 Elements				
Metals (µg/m³)	5.093	11.058	7.625	4.586
Non-Metals (µg/m³)	16.598	16.317	17.384	13.548
Metalloids (µg/m³)	NIL	NIL	NIL	NIL
Total Conc (µg/m³)	21.691	27.365	25.010	18.134
% of 41 Element w.r.t. Total PM_{10}	35.729	58.699	42.171	41.070
Major Elements (µg/m³)				
Si	2.377	2.392	1.933	2.399
Cl	8.810	7.969	12.343	4.059
K	2.287	2.586	2.664	2.126
S	5.379	5.912	3.041	6.920

Table 7.10 : PM_{10} Characterisation JABALPUR CITY

Parameters	Sampling locations			
	MPPCB Regional Office	Sanjeevani Nagar Garha	Pradeep Metal Industries	GCF Estate
	Commercial	Residential	Industrial	Reference
Total PM_{10}(µg/m³)	146.49	88.63	98.17	68.42
The weather was found clear				
Metals (µg/m³)	55.795	30.591	70.336	7.523

Parameters	Sampling locations				
	MPPCB Regional Office	Sanjeevani Nagar Garha	Pradeep Metal Industries		GCF Estate
	Commercial	Residential	Industrial		Reference
Non-Metals (µg/m³)	83.661	47.826	6.143		9.457
Metalloids (µg/m³)	NIL	NIL	1.738		NIL
Total Conc (µg/m³)	139.455	78.417	78.217		16.980
% of 41 Element w.r.t. total PM_{10}	95.198	88.476	79.671		24.817
Major Elements (µg/m³)					
Si	71.778	40.215	NIL	Pb– 58.73	6.431
S	3.000	2.618	NIL		2.160
Ca	20.569	9.279	2.505		2.739
Fe	24.608	14.768	2.926		2.242

Table 7.11 : $PM_{2.5}$ Characterisation JABALPUR CITY

Parameters	Sampling locations			
	MPPCB Regional Office	Sanjeevani Nagar Garha	Pradeep Metal Industries	GCF Estate
Total $PM_{2.5}$(µg/m³)	59.12	52.25	63.92	48.72
Levels of 41 Elements				
Metals (µg/m³)	5.656	5.381	48.619	2.395
Non-Metals (µg/m³)	11.617	9.808	11.966	5.842
Metalloids (µg/m³)	NIL	NIL	1.133937644	NIL
Total Conc (µg/m³)	17.273	15.189	61.719	8.237
% of 41 Element w.r.t. total PM_{10}	29.217	29.071	96.558	16.907
Major Elements (µg/m³)				
Si	2.890	3.309	(Si -NIL)Pb-41.470	NIL
Cl	5.866	4.298	7.034	1.809
K	2.445	2.432	4.515	1.635
S	2.776	2.141	4.906	4.011

Silicon is the major element detected in both the cities except two locations in Jabalpur. Road dust is the major source of silicon in respirable dust. It is also evident from the data that commercial areas have large exposure of $PM_{2.5}$ & PM_{10}

as compared to residential & industrial area. The increasing pressure of traffic seems to be the major contributor of ambient air pollutants.

7.19 CHARACTERIZATION OF $PM_{2.5}$ AND PM_{10} IN AMBIENT AIR OF KOLKATA, BHUBANESWAR AND TALCHER

Atmospheric inhalable particulate matter demands wide attention due to its adverse impact on human health. Few investigations have been performed in metro cities but no detail investigations have been carried out in industrial and commercial area in eastern part of India. Therefore, a study has been undertaken by Central Pollution Control Board to evaluate the mass behavior of atmospheric PM_{10} and $PM_{2.5}$.

The study revealed that average PM_{10} mass concentration in commercial area and industrial area varied from 67 to 145 $\mu g/m^3$ and 227 to 2862 $\mu g/m^3$ respectively, whereas average $PM_{2.5}$ mass concentration in commercial area and industrial area varied from 62 to 74 $\mu g/m^3$ and 93 to 204 $\mu g/m^3$ respectively. All PM_{10} mass concentration in industrial area exceeded the stipulated air quality norms, whereas 60% of the commercial area exceeded the norm. But in case of $PM_{2.5}$, all mass concentration exceeded the stipulated norms.

The ratio of PM_{10} to $PM_{2.5}$ showed that, concentration of $PM_{2.5}$ was 69% to PM_{10} whereas in industrial area it was 24%. The rank of average metallic composition of $PM_{2.5}$ in commercial area was:

Sulfur>Potassium>Iron>Calcium>Zinc>Manganese>Titanium>Lead>Copper>Chromium

whereas in industrial area it was:

Silicon>Iron>Sulfur>Potassium>Calcium>Manganese>Titanium>Zinc>Chromium>Lead> Copper>Nickel.

The observed trend of metal composition of $PM_{2.5}$ clearly indicated alteration of ambient air quality in industrial area with respect to silicon and iron. All these metals were relatively low in commercial area. The study indicate that ongoing industrial activities at Angul industrial area contribute particulate matter of less than 2.5 micron enriched with metals, which may be injurious to public health. The average concentration of all these metals are significantly high in industrial area compared to commercial area. It is interesting to mention that silicon concentration, which was practically below detection limit in commercial area, was

present in substantial quantity in industrial area with the average value of 23.3 µg/m^3. The above findings prompted to apply Pearson's correlation for better understanding of relationship between mass concentration and metals. The correlation clearly showed strong association of chromium, silicon, potassium, calcium, iron, zinc, iodine and manganese.

Table 7.12 : Average mass concentration of metals in $PM_{2.5}$ Commercial and Industrial Areas

Type of location	Si	S	Ti	K	Ca	Fe	Zn	Mn	Cu	Cr	Pb	Ni
Commercial	BDL	6.87	0.04	1.90	0.28	0.51	0.11	0.07	0.02	0.01	0.03	BDL
Industrial	16.70	7.94	0.56	5.44	4.18	10.82	0.42	1.16	0.05	0.11	0.15	0.05

** All values are in µg/m^3; **BDL-Below Detection Limit*

Elemental carbon (EC) and Organic carbon (OC) was examined to evaluate their behavior in ambient air of industrial and commercial areas. The study revealed that concentration of elemental carbon in commercial area varied from 7 to 4 µg/m^3 with an average value of 6 µg/m^3, whereas in case of industrial area it varied from 7 to 161 µg/m^3 with an average value of 44 µg/m^3. At the same time concentration of organic carbon in commercial area varied from 5 to 13 µg/m^3 with an average value of 8 µg/m^3, whereas in case of industrial area it varied from 18 to 155 µg/m^3 with an average value of 58 µg/m^3. The prevailing concentration of EC and OC in ambient air is strongly influenced by PM_{10} mass concentration, because strong positive correlation of both EC and OC with PM_{10} was observed. The ratio of EC to OC was 0.69 in commercial area and 0.59 in industrial area.

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CHAPTER VIII

ENVIRONMENTAL TRAINING

8.1 ENVIRONMENTAL TRAINING UNIT (ETU)

Environmental Training Unit (ETU) of Central Pollution Control Board organized 20 planned training programmes through various training/R&D institutes during the year 2011-12 in various priority areas related to environment. The priority areas during the year were mainly:

- Environmental legislations & enforcement.
- Hazardous waste disposal handling, storage, municipal solid waste, solid waste etc.
- Ambient air & stack monitoring technique.
- Environmental monitoring in industrial sector.
- Water quality monitoring network design, sampling, quality control & quality assurance.
- Laboratory management.
- Clean technology.
- Remote sensing, GPS, GIS & IT applications (Web Designing).
- Data Management – Analysis & Interpretation
- Proficiency testing programme & uncertainty measurements etc.

Main target groups for CPCB sponsored training programmes were participants from CPCB, SPCBs / PCCs, Laboratories recognized under the Environment (Protection) Act 1986, Industries, Hospitals, Universities, NGO's, etc.

CPCB officials were also nominated for 14 training programmes organized by other organizations.

During year 2011-12, ETU also facilitated participation of CPCB officials in 12 international training programmes / workshop / seminars sponsored by other organizations.

8.1.1 Training Programmes / Workshops Attended by CPCB Officers

In order to strengthen the technical skills of the officers and staff and to enhance the knowledge of the employees, Central Pollution Control Board, HQ has been continuously organizing various training programmes through various reputed academic / research institutes on current technologies. Details of training

programmes attended by officers of Zonal Offices during year 2010-201 are presented in Table 8.1.

Sixteen officers from CPCB Zonal office, Lucknow were nominated under 10 training programmes aimed at developing technical and managerial capabilities of the officials 8 officials from Agra Project office were deputed for training on different topics in various cities.

Table 8.1: Training programme attended by Central Pollution Control Board ZO, Vadodara Officers during year 2011 -2012,

S. No	Officer	Training programme attended	Organizing Institute	Duration
1.	Sh. Pratik D. Bharne, Sc. 'C'	Industrial Green Chemistry World-2011	Newreka Green Chemistree Foundation, Mumbai	04.12.2011 to 06.12.2011
		Application and operation of web enabled application software for online calculation of CEPI	CPCB, ESS-Division, Delhi	24.01.2012
2.	Sh. Prasoon Gargava, Sc. 'C'	Application and operation of web enabled application software for online calculation of CEPI	CPCB, ESS-Division, Delhi	24.01.2012
3.	Sh. S. Pradeep Raj, Sc. 'B'	Environmental issues, legal and statutory requirement in Mining Sector	National Law School of University, Banglore	06.02.2012 to 08.02.2012
4.	Sh. Amit R Thakkar, Sc. 'B'	Environmental issues, legal and statutory requirement in Mining Sector	National Law School of University, Banglore	06.02.2012 to 08.02.2012
5.	Dr. Nirpendra Semwal, SSA	Persistent Organic Pollutants (POPs): An overview on monitoring and analysis	India Habitat Center Delhi jointly organized by CPCB & JEOL Pvt. Ltd. Japan	19.01.2012 to 20.01.2012
		Biology in Pollution Mitigation (Sewage Treatment), through In-site Bioremediation and Bacteriophage	Indian Institute of Technology, Bombay	13.02.2012 to 15.02.2012
6.	Sh. B. R. Naidu, Zonal Officer	Study tour related to Co-processing of hazardous waste as alternate fuel to Thailand & Vietnam	SINTEF, Norway under bi-lateral project	27.11.2011 to 02.12.2011
		GEF National Dialogue workshop at Goa	MoEF along with GEF Secretariat,	08.09.2011 to

S. No	Officer	Training programme attended	Organizing Institute	Duration
			Washington DC	10.09.2011
		Oil Spill India – 2011 International conference & exhibition at Goa	Organized by OSI Secretariat	29.09.2011 to 01.10.2011
		NPL-PTB, Mic Phase-II planning workshop at Delhi	NPL	29.02.2012

8.1.2 Study tour to Thailand and Vietnam under Indo-Norwegian Co-operation Project

CPCB had entered into an agreement with The Foundation for Scientific & Industrial Research, Norway (SINTEF), for the project "Recovery of Alternative Fuels, Raw Materials and Treatment of Organic Hazardous Wastes through Co-Processing in Resource and Energy Intensive Industries in India" funded by Ministry of Foreign Affairs of the Norwegian Government, with the concurrence and approval of Ministry of Environment and Forests (MoEF) and Department of Economic Affairs, Govt. of India.

Under the project, a study tour to Cement Plants in Thailand and Vietnam, which pre-treat and co-process wastes as alternative fuels and raw materials, was planned during November 27 to December 02, 2011 for the officials of Central Pollution Control Board and State Pollution Control Boards.

The objective of the study tour was to meet the authorities, visit the pre-treatment facilities and cement plants which practice co-processing and recovery of wastes as alternative fuels and raw materials, and conduct training and capacity building. Eight officials of Central and State Pollution Control Board participated in the said programme. During this study tour, two industries, namely M/s Siam City Cement Plant, Saraburi, Thailand & M/s Holcim (Vietnam) Ltd, Hon Chog, Vietnam and their pre–processing facility service provided by Geocyle and handling operation of wastes were visited. The team visited the point of arrival of wastes by truck, wastes sampling point, laboratory facilities available for finger print analysis, pre-processing facility for various solid wastes, liquid & sludge wastes and sorted municipal solid wastes and its feeding arrangement for co-processing in cement kiln, and the online monitoring system provided for emission monitoring of the stack. The visit has strengthened the capability of SPCBs and CPCB officials to deal with various issues related to co-processing of wastes in cement kiln.

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CHAPTER IX

ENVIRONMENTAL AWARENESS AND PUBLIC PARTICIPATION

9.1 PARYAVARAN DARSHAN POGRAMME ON DOORDARSHAN NATIONAL AND 18 REGIONAL CENTRES

Central Pollution Control Board launched the second phase of the weekly TV program 'Paryaran Darshan'. The program is being telecast by national broadcasting agency Doordarshan through DD National (total 18 regional centres and 19 channels). The Regional Centres broadcast is in 12 local language, Hindi, Gujrati, Malyalam, Assamese, Kashmiri, Bengali, Oriya, Marathi, Kannada, Tamil, Telugu, and Punjabi, and covers region-specific environmental issues with cooperation from the State Pollution Control Board. CPCB for the first time has involved TV as a medium for spreading mass awareness on environmental issues.

Table 9.1 : Paryaran Darshan Programme on DD National + 18 Regional Kendres

S.No.	DD Regional Kendra	Language	S.No.	DD Regional Kendra	Language
1	Ahmedabad (Gujarat)	Gujarati	10	Lucknow (Uttar Pradesh)	Hindi
2	Thiruvanathpuram (Kerala)	Malayalam	11	Patna (Bihar)	Hindi
3	Bhopal (Madhya Pradesh)	Hindi	12	Mumbai (Maharashtra)	Marathi
4	Shimla (Himachal Pradesh)	Hindi	13	Bangalore (Karnataka)	Kannada
5	Guwhati (Assam)	Assamese	14	Chennai (Tamil Nadu)	Tamil
6	Srinagar (J & K)	Kashmiri	15	Hyderabd (Andhra Pradesh)	Telugu
7	Jaipur (Rajasthan)	Hindi	16	Jalandhar (Punjab)	Punjabi
8	Kolkata (West Bengal)	Bengali	17	Ranchi (Jharkhand)	Hindi
9	Bhubaneshwar (Odisha)	Oriya	18	Raipur (Chattisgarh)	Hindi

9.2 MASS AWARENESS ACTIVITIES BY ZONAL OFFICES

9.2.1 Vadodara

Central Pollution Control Board, Zonal office, Vadodara organized World Environment Day celebrations jointly in association with Maharaja Sayajirao University, Vadodara.

CPCB zonal office, Vadodara also organized one-day training programme for school teachers of Vadodara at its office "Parivesh Bhavan", Subhanpura, Vadodara on 18.02.2012. The basic objective of the programme was to spread the message of environmental awareness to school students through teachers. The training was imparted through presentation on various aspects of environment including air, water, solid waste, bio-medical waste, in-house laboratory visit, demonstration of instruments and monitoring equipment, video shows etc. A training kit with hard copy of the in-house prepared reference material and environmental information awareness leaflet were provided to the participants. Certificate was issued to all participants during the concluding session of the programme. Participants showed keen interest in the programme and especially appreciated the in-house laboratory visit and demonstration of monitoring and analytical instruments.

Coordination with SPCBs/PCC

Central Pollution Control Board, Zonal office, Vadodara followed up with SPCBs/PCC various matters related with parliament questions, directions issued, project studies, data compilation, meetings, training etc. and Central Pollution Control Board, Zonal office, Vadodara extended technical assistance by associating in the following committees.

- Technical Committee for clearing some projects;
- Environmental Audit Scheme; and
- Usage of pet-coke as fuel in boilers.

On request from GPCB, a team from Zonal Office associated with GPCB to assess and ascertain the cause of oil slick on south Gujarat coast on 25th June 2011. CPCB Zonal office, Vadodara also participated in the meeting and field visit of the Expert Committee constituted by MoEF on Effluent Channel Project Ltd., Vadodara during 15th-16th June 2011 and in the first meeting of monitoring committee for the Gandhi Green Memorial Project under ICZM project at Dandi, Gujarat on 12.09.2011.

Central Pollution Control Board, Zonal office, Vadodara technically assisted Daman Pollution Control Committee by associating in following Committees.

- Member of Pollution Control Committee, Daman
- Member of State Environment Impact Assessment Authority
- Member of State Expert Appraisal Committee

Monitoring of river Damanganga also carried out on request of PCC, Daman at various locations and submitted data.

9.2.2 Shillong

"Mass Awareness Programme on Environment Issues" for Students, interested Persons and Jhum Cultivators in Assam was organized at Muolhoi, Haflong, North Cachar Hills, Assam during 30 September, 2011 to 2nd October, 2011. The programme focussed on the impact of Jhum cultivation, Municipal Solid Wastes, Bio-Medical Wastes etc. on Environment (Air, Water, Soil, Forest and animal life) of the Area.

Students, farmer/cultivators and many interested persons attended the program. The need for proper management of Municipal Solid Waste and Bio Medical Waste in the hill stations where the wastes can be carried by rain, scatter and deposit in different low lying areas and polluted the Environment was emphasised. The impact of Jhum Burning on human health and flora and fauna of the areas was discussed in detail as Jhum burning results high level of Suspended Particulate Matter and Carbon Monoxide in the area.

Alternative environment-friendly occupation for the Jhum cultivators of the area was discussed in the meeting. It was decided to spread the idea in the interior part of the District. It was also decided to find out possibilities for reducing the impact of Jhum burning on environment and also to limit the time of Jhum burning in the coming years so that exposure to high level Suspended Particulate Matter and Carbon Monoxide is reduced.

Mass Awareness Programme organized by CPCB, Zonal office, Shillong

Mass Awareness in Haflong Meeting with students

Leaders of NGOs and Churches Meeting with leaders of NGOs and Churches

9.2.3 Bhopal

World Environment Day Celebration

Central Pollution Control Board, Zonal office Bhopal organized a mass awareness program at Maulana Azad National Institute of Technology (MANIT) on the eve of World Earth Day (22nd April, 2011). To spread the environmental awareness among the public, Central Pollution Control Board, Zonal Office, Bhopal conducted various activities on the eve of World Environment day (WED) on 5th June, 2011 in Bhopal city. The WED theme for this year was 'Forest: Nature At Your Service'. The message containing the same was publicized through creative banners & colorful pamphlets. Banners were displayed at important junctions in various parts of Bhopal city. Pamphlets were distributed among the public, NGOs, institutions, universities and other organizations. Plantation was carried out at 'Smiriti Van' near Bhadbhadha pool of Bhopal. The entire Program was widely covered by Doordarshan, Madhya Pradesh. The activities of Central Pollution Control Board were also widely covered by print media, both Hindi and English.

Mass awareness programs were also organized during Diwali festival to make aware the public about the ill effects of noisy crackers. Under this 04 schools & colleges were covered e.g. Mother Teresa School Kolar road, Anand Vihar School Tulsi nagar, Estern Public school Jail road & Swami Vivekananda Engineering College Bhopal. Through this mass awareness program about 1000 students were motivated towards environment protection.

9.2.4 Lucknow

World Environment Day, 2011 was celebrated at CPCB Zonal Office, Lucknow. The programmes included 1) Plantation, 2) Interaction among staff members in the conference hall to create the awareness, and 3) Banner Display.

World Environment Day Celebration at Lucknow

Plantation on World Environment Day

Project Office - Agra

World Environment Day-2011 was celebrated by Projec office, Agra in Agra city on 5th June 2011. An appeal was published in Hindi daily Hindustan, Agra edition for mass awareness on the day. The distribution of pamphlets, stickers at various locations including Tajmahal, Etmad-ud-daulah, Rambagh, Dholpur House and other places were carried out by CPCB Staff with the help of ASI on World Environment Day-2011. Mass awareness programmes were organized in two schools of Mathura and rural area of Agra district. During the programme various activities like painting competition, essay writing, debate were organised for the students. Total 158 students were issued certificate for participation/winning the competitions. 1st, 2nd, 3rd and two consolation Prizes were given to the students.

Students participation in Mass Awareness programme

Mass Awareness Programme at Agra

9.3 NGO RELATED ACTIVITIES IN CPCB

During the year 13 social organizations working on environmental protection had expressed their willingness to get enlisted as NGOs. Their credentials, activities undertaken were scrutinized and forwarded for consideration of their enlistment.

9.4 IMPLEMENTATION OF OFFICIAL LANGUAGE POLICY IN CPCB

Central Pollution Control Board is implementing Official Language Policy of Govt. of India in its Head Office and Zonal Offices. Hindi Section is ensuring compliance of Official Language as per Policy of the Union as enshrined in the Constitution of India, envisaged in the Official Languages Act and Official Languages (Use for Official Purposes of the Union) Rules, as well as orders of the Govt. of India issued from time to time in this regard.

During the year 2011-2012 Central Pollution Control Board organized 3 Hindi workshops for sensitizing the officials of CPCB with the Official Language. Seventy five officers and staff participated in these workshops.

Hindi Diwas was celebrated on 14th September, 2011 CPCB Headquarters under the chairmanship of Shri J.S. Kamyotra, Member Secretary, CPCB. Shri C.S. Bhatt, Member Secretary, U.P Pollution Control Board, Lucknow was the Chief Guest of the function. The employees of CPCB actively participated in the competitions organized. Cash prizes were awarded to the winners. Renowned poet Shri Gajendra Solanki and poetess Ms. Anju Jain graced the occasion. Parivesh Newsletter in Hindi on Bhagirathi River and a book "Jal Pradushan" were released on this occassion.

'HINDI DIWAS' Celebration during year 2011

As per the directives of Ministry of Home Affairs CPCB carries out an incentive scheme for original book writing in Hindi - "Pradushan Niyantran Aur Paryavaran Yojna Evam Prabandhan Se Sambandhit Vishayon Per Hindi Mein Maulik Pustak

Lekhan Hetu Puraskar Yojna". Five entries were received under the scheme for the year 2010-11. Committee constituted for the purpose of evaluation recommended 1st, 2nd and 3rd prizes to Shri Navneet Kumar Gupta, Project Officer, Vigyan Prasar, Noida, U.P, Shri Dev Prakash, Sr. Scientific Asst., Central Pollution Control Board, Delhi and Shri Shiv Prakash Raigar from Rajasthan, respectively.

As per the directives of Deptt. of Official Language, Ministry of Home Affairs Zonal Office, Bhopal and Project Office, Agra were inspected during the year 2010-11 to assess the status of compliance of Official Language Policy and the compliance was found quite satisfactory.

In the 71st Symposium and Workshop of Rajbhasha Sansthan, Delhi organized in Dalhousie, Himachal Pradesh, Central Pollution Control board was awarded with 'Karyalaya Deep' for its remarkable contribution in promoting the progressive use of Hindi. At this event of significance, Hindi Officer represented Central Pollution Control Board HQs & Section Officer represented Central Pollution Control Board Zonal Office, Lucknow.

9.4.1 Promotion of Use of Hindi in CPCB Zonal offices

In line with the guidelines of Rajbhasha Vibhag, Ministry of Home Affairs, Govt. of India, the Central Pollution Control Board Zonal Office, Vadodara organized Karyahsala to promote use of Hindi in office. One Kaaryashaala was organized in the Month of September as a part of Hindi Pakhwada celebration. Shri Rajiv Kumar, Member Secretary, Nagar Raajbhashaa Karyanvayan Samiti was invited as guest to deliver talk on use of Hindi as official language. The Zonal Officer also attending regular meetings of Nagar Raajbhasha Kaaryanwayan Samiti. Two Hindi Workshops were organized in office.

CPCB, Project office Agra was awarded with trophy for *''100% use of Hindi''* in 'Hindi Patrachar' and "VISHESH" certificate among 108 central Govt. offices in Agra by NARAKAS, Agra during the year 2011-12.

भारत सरकार

नगर राजभाषा कार्यान्वयन समिति, आगरा

राजभाषा विभाग (गृह-मंत्रालय)

सचिवालय : आयकर आयुक्त का कार्यालय, संजय प्लेस, आगरा - 2

प्रशस्ति—पत्र

प्रमाणित किया जाता है कि वर्ष 2011-12 में आगरा नगर स्थित समस्त केन्द्र सरकार के कार्यालयों/बैंकों/ निगमों/उपक्रमों में केन्द्रीय प्रदूषण नि. बोर्ड का कार्य राजभाषा हिंदी के प्रभावी प्रयोग में विशेष स्थान पर रहा। विभाग इस उपलब्धि पर बधाई का पात्र है। आशा की जाती है कि राजभाषा विकास में आगे भी केंद्र प्रदूषण निंद बोर्ड प्रयासरत् रहेगा।

दिनांक : 30.04.2012

आयकर आयुक्त
अध्यक्ष
नगर राजभाषा कार्यान्वयन समिति
आगरा

CPCB, Agra awarded by the "VISHESH" certificate in the field "*Technical Writing Prize*" for the use of Hindi in Technical writing during year 2011-12 by NARAKAS, Agra.

9.4.2 Miscellaneous Activities Central Pollution Control Board by ZO-Vadodara

- Chairman, Central Board visited Ankleshwar & Panoli industrial estates on 29.12.2011to review the status Directions under Section 18 (1) (b) of the Water Act were issued by Central Board.
- The samples of sachet of Gutkha & Pan Masala. Samples along with samples received from HQs submitted to CIPET Ahmedabad for analysis of packaging material for various types of plastics.
- Parliamentary standing committee on Science & Technology, Environment & Forets visited Western Zone on 18th-19th July 2011, 17th October, 2011, 20th - 21st, January 2012 in the context of issues associated with Oil Refineries, Pharmaceutical Sector and Government Mint., ONGC Offshore. Co-ordination with SPCBs and concerned units and compilation of background information carried out by Zonal Office.
- Team of officials from HO and Zonal Office visited common HWTSDF facility of Ankleshwar on 24.02.2012 for compliance verification as follow-up of directions issued under Section 5 of the E (P) Act.
- Visit made to verify the implementation status of MSW facility demonstration project at Jalna, Maharashtra in the month of March 2012. The matter also pursued with concerned official of Jalna Nagar Parishad and Maharashtra Pollution Control Board due to inordinate delay in completion of the project.

9.5 RIGHT TO INFORMATION ACT, 2005

The Right to Information Act, 2005 came in force for implementation vide Gazette of India Notification No.25 dated June 21, 2005, New Delhi. As per clause 2(h) of the RTI Act 2005, CPCB is covered as "Public Authority".

- CPCB has appointed 34 CPIOs and 1 Appellate Authority for dealing the requests received from Information Seekers.

- A Manual has been compiled and uploaded on the CPCB's website as per clause 4(1)(b) of the RTI Act, 2005.
- Applications were received under RTI from the Public, NGOs, VIPs and VVIPs. Accordingly applications are disposed and follow up maintained on the pending matters.
- During the year nine RTI applications were received at Central Pollution Control Board, zonal office, Vadodara and available information as desired by the applicants were provided in time.
- Status of the applications received under RTI during 2011-12 are as follows:

Quarter	RTI Applications	Appeals	Transferred
Apr. - June, 2011	54	0	11
July - Sept., 2011	66	2	25
Oct. - Dec., 2011	57	4	14
Jan. - Mar., 2011	79	18	18
TOTAL	**256**	**24**	**68**

9.6 PUBLICATIONS DURING YEAR 2011-12:

Publications during year 2011-12 are given in ***Annuxue - VII.***

9.7 CPCB LIBRARY

CPCB Library is well equipped to facilitate lending and reference service to its officials in the field of environmental science & engineering and pollution abatement. The Library has a specialized collection of 10,000 information resources comprising books, reference resources, in-house publications, reports and Nationals and International peer reviewed journals. The library has been renovated and e-Granthalaya - library automation software has been installed for automation of library holdings. The data entry of library holdings is being done and would facilitate access to bibliographical information; these include database of books, journal articles, and serial holdings.

9.8 ACTIVITIES OF ENVIS CENTER

- Regular updation of Website.
- Addition of Environmental calendar and new WebPages for Kids Corner & "Green Flash" on website - www.cpcbenvis.nic.in
- Compilation of News clippings on environment related issues appearing in 10 English newspapers and 6 Hindi newspapers.

- Participation and Presentation in an workshop on "National Workshop on interaction meet of ENVIS Centers"
- Scanning of CPCB reports for display on website, to disseminate information.

9.9 PARTICIPATION IN EXHIBITIONS/MASS AWARENESS PROGRAMMERS.

Central Pollution Control Board has participated in various exhibitions and Mass awareness programmes throughout the year during 20011-12 some important participations are as below:

S. No.	Date	Exhibitions
1.	5 June 2011	World Environment Day, National Science Center
2.	10 June 2011	World Environment Day organized by ONGC.
3.	28 June 2011	Exhibition at Hotel Ashoka for Male Delegation.
4.	27 Aug-4Sept. 2011	Delhi book fair
5.	30 Sept. 2011	National Student Science Seminer NSC Pragati Maidan
6.	7-8 Sept. 2011	India Carbon Market Conclave at Hotel Le-Meridian
7.	12-14 Oct. 2011	International Conclave on Climate change hitex Hyderabad
8.	14-27 Nov. 2011	IITF Pragati Maidan, New Delhi
9.	14-16 Dec. 2011	Safety & Environment Challenge, ONGC at Agra.
10.	3-7 Jan. 2012	Pride of India, 99th Indian Science Congress, Bhuvneshwar
11.	25-Feb. to 4-March 2012	World Book Fair, Pragati Maidan Delhi

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CHAPTER X

ENVIRONMENTAL STANDARDS INCLUDING SCHEDULE FOR THEIR ENFORCEMENT

10.1 DEVELOPMENT OF ENVIRONMENTAL STANDARDS

Central Pollution Control Board takes up development/revision of Environmental Standards, upgradation of comprehensive Industrial Document (COINDS) and guidelines for Environmental management in various industrial sectors. Activities undertaken during year 2011-12, regarding Environmental Standards enforcement are summarized below:

10.1.1 Harmonization of Environmental Standards for Pesticide Industry

Effluent and Emission standards for Pesticide industry were notified at Sl.No. 40 and effluent standards at Sl. No. 71 respectively under Schedule I of the Environment (Protection) Rules, 1986. The Emission and Effluent standards for incinerator for pesticide industry were notified at S. No. 101 under Schedule I. The standards for pesticide industry notified at different places were causing confusion regarding their applicability. In order to avoid the confusion in applicability of standards for pesticide industry, it was proposed to harmonize standards and to bring all norms under single serial number. The notifications at all three serial numbers (40, 71 & 101) have been harmonized and brought under single Sl. No. 40.

10.1.2 Harmonization of Standards for Iron & Steel sector

Environmental standards for discharge of emissions and effluent from Integrated Iron & Steel Plants have been harmonized including revised emission standards for Blast Furnace and Steel Melting Shop for ease of reference, and notified on March 31, 2012.

10.1.3 Effluent standards for Soda Ash Industry

Soda Ash forms an important part of Indian inorganic chemical industry. It is a high volume, low value product and finds application mainly in the production of detergents, glass, chemicals, sodium silicate, pulp & paper and water treatment. The process of brine purification produces effluent as spent brine solution containing clay, silt, sand, calcium and magnesium carbonate, magnesium sulfate

and high content of sodium & calcium chloride. The effluent is generally mixed with adequate quantity of seawater to reduce the concentration of suspended solids (SS) and discharged in the sea. The effluent from soda ash industry being heavier than seawater, the best option is to release it through surface outfall at a location where sufficient dilution is expected.The composition of final effluent indicate that the water quality parameters viz. temperature, pH, Suspended Solids, ammonia and calcium in the receiving seawater and carbonate contents in sediment around the effluent disposal site are influenced and can have adverse effects on flora and fauna particularly around the disposal site. The studies were conducted at four locations viz. Mithapur, Porbandar, Sutrapada and Bhavnagar, where Tata Chemicals Ltd, Saurashtra Chemicals Ltd, Gujarat Heavy Chemical Ltd and Nirma Ltd, respectively release their effluents. The study was taken up in association with National Institute of oceanography (NIO) Goa .The revised effluent standards of this sector, were approved Peer and core Expert committee and in Board Meeting of Central Pollution Control Board. The standards were notified vide GSR 424(E), dated June 1, 2011.

10.1.4 Effluent and Emission standards for Dyes and Dye Intermediate.

The effluent standards on Dyes and dye intermediate industry were notified at Sl. No. 8 under the Environment (Protection) Act, 1986. Considering present status of industries, pollution control technologies and retro fitment in existing industries, effluent standards for this industrial sector are revised and gaseous emission standards developed. The Peer and Core Expert Committee in its Twenty sixth meeting held at Parivesh Bhawan, Delhi on November 14, 2011 finalized the standards.

10.1.5 Environmental Standards for Fertiliser Industry

The revised standards for fertilizer Industry were discussed in the Peer & Core Committee meeting held on November 14, 2011. It was suggested to collect latest data for the units through FAI and directly from units. Accordingly, data were collected. Compiled data with proposed standards are proposed to be discussed in next Peer and Core Committee meeting.

10.1.6 Review of Emission Standards and Preparation of Comprehensive Industry Document (COINDS) on Manmade Fibre Industry

Revision of emission standards for carbon disulphide (CS_2) and hydrogen sulphide (H_2S) is solicited by Association of Manmade Fibre Industry for new and expansion projects due to non-availability of desirable cost effective technologies to meet the

existing emission norms for CS_2 and H_2S. This proposal addresses the revision and up gradation of the existing Comprehensive Industry Document (COINDS), first prepared in the year 1979-80 for liquid effluents for Manmade Fibre Industry. The objectives of study also include to review existing effluent standards for Rayon and Nylon Industry. The study was initiated in association with NEERI, Nagpur. The field study has been completed and draft final report is under preparation.

10.1.6 Development of Comprehensive Industry Document (COINDS) for Automobile Manufacturing Industries

This study being undertaken in association with TERI. The objectives of the study include Inventorisation of automobile manufacturing industries, process details covering all categories of vehicles, identification of different sources of pollution, characterization of liquid effluent, gaseous emissions and hazardous wastes storage and disposal methods, resource recycling and waste minimization practices, identification of technologies appropriate for the control of water pollution, air pollution and fugitive emissions under Indian conditions and development of environmental standards for the automobile manufacturing industry.

10.1.7 Development of Comprehensive Industry Documents (COINDS) for cement plants

There are about 130 cement plants in the country with total production capacity of 220 MTPA. During various operations of cement manufacturing, substantial quantum of dust is emitted, if air pollution control device is not operating efficiently, which poses serious problem. Considering the above, a study on "Development of COINDS on cement plants" has been undertaken in association with National Council for Cement and Building Materials, Ballabgarh. Based on the study, standards for particulate matter shall be revised. It is also proposed to develop emission standards for SO_2 & NOx and load based emission standards for particulate matter from cement plant. The study of about 15 cement plants have been completed and draft report is being evaluated.

10.1.8 Development of standards & clean technology for Sintering Plant

A project has been taken up to study clean technology options in sintering plant such as Emission Optimized Sintering (EOS), Sinter Cooler Off-air Recirculation, Sensible Heat Recovery System of Exhaust Gas, Maximized Emission Reduction of Sintering (MEROS) etc. to improve energy efficiency and minimize emissions. The study was conducted in association with MECON. The draft report is prepared and

under review. Based on the study findings, the existing PM emission standards are proposed to be revised.

10.1.9 Development of guidelines for control of fugitive emissions in Integrated Iron & Steel Plant

Best practices for control of fugitive emission in Integrated Iron & Steel Plants have been studied. Based on the study, guidelines will be set to control fugitive emissions from various process operations including storage, preparation and conveying raw material, coke making, sintering, iron making and steel making in BOF plant.

10.1.10 Development of emission factor for various units of an Integrated Iron & Steel Plant

Integrated iron & steel plants have a number of process units, which cause air pollution problems. Emission estimates are important for developing emission control strategies, determining applicability of permitting and control programs, ascertaining the effects of sources and appropriate mitigation measures. Emission factors are available in literature for integrated steel plants, for example AP-42 developed by USEPA. However, in Indian context emission factors are not available.

Therefore, a study has been undertaken to develop emission factors for various process units of Integrated iron & steel plants. The base work is completed and draft report prepared. The findings are under review.

10.1.11 Preparation of Comprehensive Industry Document (COINDS) and the Status of Paint Industry (Review of Effluent Standards and Development of Emission Standards)

Paints constitute a mixture of solvents, binders, pigments and additives. The raw materials used in the manufacture of paint are organic chemicals, solvents, heavy metal based pigments or complex resins which results in air emissions (VOC & dust), wastewater and solid waste / sludge (containing heavy metals & toxic organic chemicals). To control these pollution aspects COINDS for paint industry was prepared in during year 1990-1991 for development of effluent standards only. Since then sector has undergone fundamental changes in terms of raw materials consumption, technological up-gradation, and demand growth potential with an average rate of 13% over the last five years. There is a need to revise existing effluent standards and to develop emission standards (VOCs). This study

has been initiated in association with National Productivity Council, New Delhi. In first phase, dry study is carried out in 10 units. Based on this, 6 units covering all type of paints, varying production capacities, location selected for In-depth study. It has been found that the main source of waste water is from mixer/ pug mills/ TSD/ cleaning operation & floor washing. Solid wastes are generated from ETP, production process and from incinerator. The main source of VOCs are mainly from shop floor during filling operation. The emitted VOCs in the shop floor were extracted from one side through exhaust system and fresh air is allowed to flow from other end. The final report is under finalization.

10.1.12 Development of Noise Standard for off-road vehicles and construction equipments

There is an exponential use of construction equipments and off road vehicles, which posing threat in terms of Noise Pollution. Therefore, steps are required to be taken to mitigate noise generation from these equipments. As a first step, Central Pollution Control Board (CPCB) has initiated a study to develop noise standards for off road vehicles and construction equipments to asses Noise Pollution. This issue was discussed in the 19th meeting of the 'National Committee on Noise Pollution Control' held on 07th March 2012 to decide the methods and monitoring protocol. The Automotive Research Association of India (ARAI), Pune is carrying out noise measurement on the following categories of vehicles / equipments.

- Tracked dozers, tracked loaders, tracked excavator-loaders
- Wheeled dozers, wheeled loaders, wheeled excavator-loaders, combustion engine driven counterbalanced lift trucks, mobile cranes

On the basis of findings, of the study Noise standards for off road vehicles and construction equipments will be proposed.

10.1.13 Revision of Emission norms for Petrol, Kerosene and Diesel driven Gensets

Due to enormous use of Gensets, emissions from Gensets increasing manifold. To reduce such emissions it was realised to revise the existing emission norms for DGset (notified in the year 2002) and Generator sets run by Petrol and Kerosene (notified in 1999). The issue was discussed in 12th meeting of the "Standing Committee on Emission from RIC Engine for Off-road Applications" held on September 06, 2010. Subsequently, it was approved by the 26th Peer and Core Committee meeting held on 14th November 2011 with effective date of implementation for DGset on 1st July 2013 and 1st April 2014 for Petrol and Kerosene driven Genset.

10.1.14 Development of Noise and Emission standard for LPG and CNG driven Gensets

The 'Standing Committee on emission from off road vehicles and Construction equipments' and 'National Committee on Noise Pollution Control' advised Central Pollution Control Board to develop emission and noise standard for LPG and CNG driven Genset. According the Noise & Emmission Standard for LPG and CNG driven Genset were finalyzed and proposed. The Peer and Core Committee has approved the Noise and emission norms with proposed implementation date 1st July 2013.

10.1.15 Coliform Standards for treated sewage

Microbiological quality of water in terms of Coliform continues to be a major water quality issue in our country. Major source Coliforms Contamination is domestic sewage. To achieve water quality target in receiving water w.r.t. Coliform, it is important to reduce Coliform density of sewage. Coliform are generally removed from sewage along with BOD & SS to large extent in a sewage treatment plant, still the number is so high that achieving targeted Water Quality in receiving water bodies is difficult. Presently no standard is specified for Coliform in treated sewage. A large number of STPs are being established under NRCD. In ordef to provide proper design criteria for STPs to reduce Coliform, standards to be achieved in the treated sewage is pre-requisite. Accordingly, Central Pollution Control Board has carried out studies through reputed agencies and also at its own laboratories. Based on the studies, CPCB in its 149th & 150th Board meeting approved the draft standard and forwarded to MoEF for its notification during year 2009-10.

Pursuanted to decision of MoEF, during 2010-11, a study was conducted to review the standards proposed earlier by CPCB, in association with Indian Institute of Technology, Delhi for "Techno-Economic Feasibility of Reduction of Microbial Pollution for the STPs". The study is in progress in association with Indian Institute of Technology, Delhi.

10.1.16 Implementation of environmental standards for Petroleum Oil Refineries and Mass based standards for Oil Refineries and Corporate Responsibility for Environmental Protection (CREP) in Oil Refinery Sector

The third meeting of the National Task Force for implementation and monitoring of the charter for Corporate Responsibility for Environmental Protection (CREP) and

review of compliance of standards for Oil Refinery was held on September 30, 2011 at Mumbai.

The following tasks for refineries were recommended for implementation of standards under CREP:

- Possibilities of co-processing of oily sludge in Cement Kilns & Power Plants should be explored and time targets specified for the same.
- Details of major shutdowns taken during last 05 years with task carried out during these periods for compliance of CREP recommendations and implementation of new standards.
- Compile data on particulate matter emitted, wherein the dual fuel (gas & oil) issued, to assess the factors effecting achievability of emission norms.
- To sell pet coke only to those units having valid consent under the Air Act and equipped with proper air pollution control devices.
- Report on Risks involved in covering effluent treatment facilities with VOC removal system and measures proposed for full proof safety system.
- Upload the environmental status details including effluent characteristics, source emission data, ambient air quality and solid/hazardous waste generated, stored & disposed on the websites for public information.
- Brief note on report of LDAR to assess the total losses along with steps taken to reduce the losses will be submitted by all units.
- All the refineries will provide real time data on ambient air and source emissions to CPCB. The units will monitor all the notified parameters for compliance verification.
- The refineries will strengthen the infrastructure facilities for monitoring of all the parameters as per notified standards with respect to effluent, ambient air quality and emissions.
- The refineries will submit a detailed report on the adequacy of process and effluent treatment facilities.
- The units should submit the details on management of oily sludge, tank bottom sludge management. The new tankers, whenever inducted into service are provided with bottom loading facilities.

10.1.17 Review of Environmental Statements Submitted By Industries – Additional Sectors (Phase – II)

The Ministry of Environment and Forests, Government of India issued notification for submission of '*Environmental Statements*' (ES) by the industries to the respective State Pollution Control Boards (SPCBs) in April, 1992 and further amended in April, 1993. ES is a pro-active tool for self-examination of the industry

itself to reduce / minimize pollution by adopting process modifications, recycling and reuse of the resources. The regular submission of ES will indicate the systematic improvement in conservation of resources and environmental pollution control being achieved by the industry. In other way, the items of ES may be used as environmental performance indicators for relative comparison, implementation and to promote better practices.

In order to assess efficacy of Environmental Statement, the project "Review of Environmental Statements Submitted by the industries" was taken up by Ministry of Environment & Forests and carried out by Central Pollution Control Board (CPCB). The Central Pollution Control Board engaged the Institutions having expertise in the concerned field to review the ES for Chlor-alkali, Dye & Dye intermediates, Aluminium smelter, Zinc smelter, Copper smelter, and Fertilizer sectors in order to cover major priority industrial sectors under the programme in the second phase of work. The outcome of the exercise has been utilized for setting the environmental benchmarks for attainment by the industries.

10.1.18 Use of beneficiated/ blended coal in Thermal Power Plants

As per notification during year 1998, 34 plants require to use beneficiated coal. However, after imposition of CEPI 16 more plants including 3 new plants located Critically Polluted area are required to use beneficiated coal. Thus, total 50 power plants required to use beneficiated coal. As per the information provided by the plants, only 29 plants are meeting the provisions of notification on use of beneficiated coal. As total capacity for beneficiation of coal is not sufficient to meet the demand of washed coal, plants are not getting adequate quantity of washed coal. Hence there is need to augment the capacity of washing of coal.

To meet the requirement of all 50 power plants identified for use of beneficiated coal, total beneficiated coal requirement is 214 million tones per annum. As present availability of washed coal is about 126 million tones per annum, there is a gap of about 88 million tones. About 108.76 million tones capacity for beneficiation of coal is under installation, which is likely to be available by year 2015. Coal India Ltd. has proposal for beneficiation of coal capacity of about 100.6 million tones based on Built Own & Operate basis.

10.1.19 Utilization of flyash

During 2010-11, about 474 million tonnes coal was consumed in power sector including captive power plants which in turn generated about 160 million tonnes of flyash. Out of 160 MTA, about 923 MTA flyash was utilized for various purposes.

Though, power plants have submitted time bound action programme to achieve hundred percent flyash utilization, only 15 (out of 108 plants) have achieved 100% utilization while 43 plants achieved more than 50% the targeted utilization.

The important areas of ash utilization and percentage of utilization in respective areas during 2011-12 are presented below.

Area of utilization	Percentage of utilization
Ash dyke raising	8
Cement manufacturing	38
Land filling	20
Brick manufacturing	09
Road & Flyover embankments	6
Mine back Filling	6
Ready Mix Concrete	3
Agriculture	<1
Export	2
Other includes (Cenosphere)	8

10.2 CO–PROCESSING OF WASTES IN CEMENT KILN

The Hazardous Wastes (Management and Handling & Transboundary Movement) Rules, 2008, provided specific section i.e. Rule 11 dedicated to utilization of Hazardous wastes as a supplementary resource or energy recovery or after processing. In view of this Central Pollution Control Board has made Guidelines on Co-processing in Cement / Power / Steel Industry and these were posted on CPCB website (www.cpcb.nic.in). The trial run for co-processing of few categories of wastes and later granted regular permission for the same.

In line with above, CPCB along with SINTEF, Norway under the bilateral project on "Recovery of alternative fuels & raw materials and treatment of organic hazardous wastes through co-processing in resource and energy intensive industry in India" organized a one day Workshop on "Co-Processing of Wastes in Cement, Iron & Steel and Thermal Power Plants" on October 20, 2011 at Bangalore (Karnataka). The targeted group of this workshop was Cement Plants, Thermal Power Plants, Iron & Steel plants as a co-processor, other industrial sectors as incinerable waste generators and TSDF & Incinerators as processors. The programme was divided

into three technical sessions, to share the experience of Central and State Pollution Control Boards, Cement industry, Iron & Steel plants etc.

The workshop was inaugurated by Prof S. P. Gautam, Chairman, CPCB. Sh. A. S. Sadashivaiah, IFS, Chairman, Karnataka State Pollution Control Board (KSPCB), Dr. Kare Helge Karstensen, SINTEF, Norway and Sh. S. M. Puttabudhi, Member Secretary of KSPCB were present during the inauguration. Around 120 participants from Cement, Thermal power plants, Iron & Steel, Pharmaceuticals, and Distillery sectors from all over India, Experts from different universities and representatives from Central Electricity Authority, BHEL, SAIL, NPC and others participated in the event, shared their views and made event a grand success.

Figure 10.1 : Workshop on Co-processing of wastes in Cement, Iron & Steel and Thermal Power Plants at Bangalore

As per inventory of Karnataka State Pollution Control Board (KSPCB), about 5500 MTA of incinerable waste is generated from 1028 industrial units located in Karnataka. Now, considerable portion of these incinerable wastes are used as supplementary resource or energy or after processing in Cement Kilns, as per the Hazardous Wastes (Management and Handling & Trasboundary Movement) Rules, 2008. This has reduced / discouraged the waste sent for incineration. The Cement plants co-processing hazardous wastes in Karnataka are as follows:

- M/s. ACC Ltd, Wadi, Gulbarga
- M/s. Vasavadatta Cement, Sedam, Gulbarga.
- M/s. Rajshree Cement Works, Malkhed Road, Gulbarga
- M/s. Heidelberg Cement India Ltd, Tumkur

The types of wastes utilized in co-processing are Ink Sludge, Distillery spent wash, Process & organic residues (solid, liquid and sludge), ETP sludge, Paint sludge, FRP scraps (Green Mesh Resin), Plastic Wastes and other non-recyclable wastes.

10.2.1 Assessment of Hazardous Waste Co-processing at various industrial sectors in Central Zone

The implementation of co-processing of hazardous and non hazardous solid & liquid wastes in central zone comprising Madhya Pradesh, Chhattisgarh and Rajasthan as all the three states are having energy intensive industries like cement, steel and thermal power plants have been assesed by Central Pollution Control Board, zonal office, Bhopal. The main objective of the study is to explore the possibility and assess the types of wastes to be co-processed, their availability, suitability and practical concerns of handling different materials (hazardous or non- hazardous). Waste materials being used for co-processing are referred as alternative fuels and raw materials (AFR).

An interaction meet was also organized with the industrial representatives to explore the possibilities of using available wastes in their plants after assessing the positive & negative aspects of AFR use in their process.

There are around 35 cement plants, 100 sponge iron plant and 14 large thermal power plants operation at in Central Zone which are using large quantity of fossil fuel. Some wastes are being utilized in a few cement plants for resource and energy recovery. Co-processing is also being practiced by Steel and Thermal power plants; however it is in initial stage. Sponge iron industries are also using dolochar as AFR blended with coal in AFBC boilers.

Co-processing in Cement Industry: Out of 35 cement plants in central zone, 18 plants are practicing co-processing/co-incineration. So far in Madhya Pradesh about 33000 MT, in Rajasthan about 10, 50,000 MT & in Chhattisgarh about 2,200 MT waste has been co-processed in Cement Industries.

The suitability of wastes in cement plants depends on kiln operation, raw material and fuel compositions, waste feed points, gas-cleaning process, clinker quality, probability of persistent organic pollutants (POPs) formation. The blast furnace slag, induction furnace slag and ferro alloy slag is an abundant waste available in central zone & may be used for trial in cement plants.

Co-processing in Sponge iron industry: Iron ore, coal and dolomite are used as raw material in sponge iron industries. Possibility of replacement of coal with hazardous waste in this process is less as compare to others because of ash generation that further needs proper disposal. RDF, Tyre chips and biomass based fuels are the limited options to replace coal in sponge iron industries. Use of hazardous waste as AFR can be more justified in Cement plants as compared to sponge iron industry based on the facts presented in Table 10.1.

Table 10.1 : Used Hazardous Waste as Alternative Fuel and Raw Materials (AFR) in Cement Kiln and Sponge Iron Kiln

Cement Plant Kiln	Sponge Iron Plant Kiln
Maximum temperatures of approximately 2000°C (main firing system, flame temperature) in rotary kilns	Maximum temperatures of approximately 1400°C (main firing system) in rotary kilns
Gas retention times of about 8 seconds at temperatures above 1200°C in rotary kilns	Gas retention times of about 4 seconds at temperatures above 1100°C in rotary kilns
Material temperatures of about 1450°C in the sintering zone of rotary kilns	Material temperatures of about 1400°C at the cooler discharge of rotary kilns
Sorption of gaseous components like HF, HCl, and SO2 on alkaline reactants	Due to Neutral medium inside the kiln, acidic gases can damage the inner linings
No possibility of metal contamination by process waste because no waste generated	Char is generated as process waste it is either burnt in AFBC boiler or dumped in low line, hence possibility of ground water contamination may not be ruled out
Waste containing Ca, Si, Na, K and Fe may be used as resource recovery by substituting additives	Reduction of iron ore is the only process hence substitution not possible

Co-processing in Thermal Power Plant

The maximum temperature in the boiler or firing zone of thermal power plant is about 800°C to 950°C with retention time of 2 to 4 seconds. According to thermal power plant professionals, the use of Hazardous Waste blended/ used with coal results formation of acidic gases which may damage the boiler tubes and corrode the inner-linings of the ESP/Bag house. Hence RDF, rice husk, mustard husk, soya husk and other similar Calorific Value (CV) wastes are the limited options for replacing coal.

Trial runs in few power plants were conducted using waste oil, TBS and ETP sludge in a small quantity without any major variation in emission quality. Ion exchange resin, waste oil and oil soaked cotton are the main wastes which are generated from power plant operation. The exhausted resin having the Calorific Value more than 4000 cal/g can be mixed with coal and burnt in the boiler for which Successful trial runs have been conducted. The emission results during trial run not showing any significant changes in the emission. Various types of wastes i.e. High calorific value wastes like TBS, Selected HW, Char waste, bio-mass including agricultural residue, spent solvent can be used as resource and energy recovery by substitution of fuel (coal, oil) in AFBC & CFBC boilers and captive power plants.

Further possibility of industrial process wastes like Brine sludge (Chlor-Alkali industries), Ion exchange resin (WTP/DM plant), Red mud, Spent Pot Liners (Aluminium industries), ISF slag, Jarosite (Zinc industries), Char Waste (Sponge iron industries), Spent Solvent (Pharma & Chemical industries), Paint sludge (Automobile & paint industries), Lime sludge {Paper, Carbide, Phospho-chalk, sugar sludge, soda ash, Chrome} (Paper mill, Carbide plant, Soda ash plant), ETP sludge (ETP), RDF (MSW plant), Tank Bottom Sludge (Petroleum refineries, Waste oil recyclers), Steel slag (Steel industries) and Marble slurry waste to be explored for co-processing/ co-incineration.

10.1.19 Revision of Effluent Standards for Common Effluent Treatment Plants

Central Pollution Control Board (CPCB) has undertaken the revision of the existing Effluent Standards for Common Effluent Treatment Plants (CETPs). The draft revised standards for CETPs, along with rationale for the modification, were circulated to stakeholders for consultation. MoEF, CLRI, HSPCB, MPPCB, TNPCB, WBPCB, JETL Hyderabad, PETL Pattancheru, VWEMCL Vapi, NCTL Ankleshwar, TTC Navi Mumbai, PLF/PETS Jalandhar, UTPCC Unnao provided comments on the proposed effluent standards for CETPs. Besides, Central Leather Research Institute (CLRI), which had carried out a project for revision of environmental standards for tanneries, also suggested revised primary treatment standards for tanneries whose effluent is further treated in CETP and proposed revision of final effluent standards for tanneries' CETPs. The comments received were considered and the integrated modified proposal of 'Revised Effluent Standards for Common Effluent Treatment Plants (for general and tanneries' CETPs) has been prepared for placing before Peer & Core Committee.

10.1.20 Revision of Effluent Standards for Tanneries

Central Pollution Control Board (CPCB) had undertaken the study for Revision of Comprehensive Industry Document on Tanneries in association with Central Leather Research Institute (CLRI), Chennai. Based on the report, the revision of environmental standards for tanneries has been undertaken. The effluent standards suggested by CLRI were further reviewed in CPCB and the draft revised standards, along with rationale for the modification, were circulated to stakeholders for consultation. The comments received were considered and the modified proposal of 'Revised Effluent Standards for Leather Tanneries' have been prepared for placing before Peer & Core Committee.

10.1.21 Revision of COINDS and Emission Standards for Brick Kilns

Central Pollution Control Board (CPCB) has undertaken the study for Revision of COINDS and Emission Standards for Brick Kilns in association with Punjab State Council of Science and Technology (PSCS&T). The study was initiated in May 2010. Inventorisation and in-depth studies were carried out and an interim report prepared during the year 2011-12.

10.1.22 Evaluation and Improvement in Design of Clamp Kilns

Central Pollution Control Board (CPCB) has undertaken the study for Evaluation and Improvement in Design of Clamp Kilns in association with The Energy and Resources Institute (TERI). The study was initiated in January 2010. In-depth studies were carried out during the year 2011-12 and based on the study, cost-effective modifications in existing design and firing practices etc. were recommended. The findings/ recommendations of the study were presented in a Workshop / Interaction Meet held at CPCB HQ on March 26, 2012 to finalize proposed modifications in the existing design. The proposed modifications in the existing design will be demonstrated and study completed.

10.1.23 Compliance Status of Oil Refineries to New Standard in Eastern Region

Ministry of Environment and Forests (MoEF) has notified new emission and effluent standards for Oil Refineries in India with time target for implementation and compliance. As the time specified for their implementation and compliance has lapsed, a study to assess the present compliance of oil refineries in the eastern region was undertaken by Central Pollution Control Board.

There are two oil refineries under public sector having requisite Emission Control Systems (ECS). However, online Monitoring System was found operational for one unit only.

Both the oil refineries in eastern region need to put effort for proper management, handling storage, transport of their HW. They are yet to install requisite infrastructure in order to comply with the stipulated norms issued by MoEF vide its 18th March 2008 notification for air and water. As many of the stipulation are based on individual refinery processing practices, respective SPCBs has to prepare refinery specific norms for compliance verification. Verification also requires up-gradation of infrastructure and skill at regulatory level as well for many of the specified parameters in Air, Water & Hazardous Waste.

10.3 MASS EMISSION STANDARDS

Mass emission standards are the primary technical policy for controlling emissions from vehicles. The Motor Vehicles Act, 1988, and the Central Motor Vehicles Rules (CMVR), 1989, are the principal instruments for regulation of motor vehicular traffic/emissions throughout the country. The implementation of various provisions of this Act rests with the state governments. The Ministry of Road Transport and Highways (MRTH) acts as a nodal agency for the formulation and implementation of various provisions of the Motor Vehicles Act and CMVR.

- Mass Emission Standards (Bharat Stage IV) have been notified for all categories of new vehicles (except two and three wheelers) in 11 mega cities, to be implemented on or after 1st April, 2010.
- Mass Emission Standards (Bharat Stage III) have been notified for two and three wheelers all over the country, to be implemented on or after 1st April, 2010.
- Mass Emission Standards (Bharat (Trem) Stage III) have been notified for every diesel driven agricultural tractors, to be implemented on or after the 1st April, 2010 for the category < 37KW and on or after the 1st April, 2011 for the category >37 KW.
- Mass Emission Standards (Bharat Stage III) have been notified for two and three wheelers, to be implemented on or after 1st April, 2010.

Fuel Quality Specifications

- Auto-Fuels commensurate to Euro III (whole country) and Euro IV (for 11 cities) specifications has been made available in the respective cities from 01.04.2010.
- The Research Octane Number (RON) for premium petrol available in 11 mega cities has been boosted to 95 with lead content being reduced to 0.005 g/l and benzene content of maximum 1%. From 01.04.2010, the content of sulphur in gasoline has been reduced to 0.005% (50 mg/kg) from 0.015% (150 mg/kg). The content of sulphur in gasoline become 0.015% (150 mg/kg) all over the country from 01.04.2010.
- For diesel the Cetane Number has been enhanced to 51 with Sulphur content further reduced to 0.005 % (50 mg/kg) in the 11 mega cities since 01.04.2010. The amount of sulphur in diesel is proposed to be 0.035% (350 mg/kg) all over the country
- Important fuel specification of Diesel and Gasoline as made available in metro cities since 01.04.2010 are as follows:

Table 10.2 : Fuel Specifications of Diesel and Gasoline available in Metrocities since 1.4.2010

Specifications	Requirements
DIESEL	
Cetane Number (CN), min	**51**
Total Sulphur, max	**0.005 % (50 mg/kg)**
Distillation , 95% vol. recovery at 0◦C, max	**360 ◦C**
Polycyclic Aromatic Hydrocarbon (PAH), max	**11 % mass**
GASOLINE	
Research Octane number (RON), min	**95**
Reid Vapour pressure (RVP), max	**60 kpa**
Benzene content, max	**1% Volume**
Lead content (as Pb),max	**0.005 g/l**
Sulphur, total, max	**0.005 % (50 mg/kg)**
Aromatics content, max	**35 % volume**
Oxygen content, max	**2.7 % volume**

In-Use Vehicles

- It has been notified that the tourist transport operators shall not engage or use any vehicle for the purpose of journey, the origin and destination of which falls within the National Capital Region (NCR), unless such vehicle conforms to the mass emission standards (Bharat Stage III), notified vide GSR 58(E) dated January 30, 2009.
- MRTH has constituted a task force to introduce auditing system in PUC centers all over the country, to look into various aspects related to procedure, implementation and suggest effective institutional mechanism for the same, in which CPCB is one of the members.

10.4 ENVIRONMENTAL STATUS

10.4.1 Environmental Status of Iron Ore Pellatization (IOP) Plants

About 55% of the proven Iron ore reserves are located in Eastern Zone in India. Useable iron ore lump comprises 40% of total run of mine and rest lies as fines and rejects. Iron Ore Fines/blue dust cannot be directly used for iron making with the existing technologies either via blast furnace or sponge iron route. Such resource deposit/dumps cause enormous environmental concerns. Indian National Steel policy aims at 110 million tonnes (MMT) finished steel by 2020 along with 100 MMT of exports commitment, requiring 400 MMT of iron ore mining (Run of mines) exploration and generation of about 120 MMT of fines each year.

Within the zero waste processing framework, advance process synthesis for utilization of iron ore involves state-of-the-art mineral processing technologies for iron ore beneficiation and development of agglomeration processes like Pellatization. Pellets are produced in the form of globules from fine iron ore and are used for production of Sponge Iron and with some limitation as a supplement in Blast furnaces. Pellatization technology is a sustainable, economical and eco friendly option to dominate in future due to shear benefit of its potential to utilise natural resources presently being dumped. Considering the rising demand of pallets and growing number of such industry. The assessment of pollution sources of the processes and measures adopted for its abatement and control have been made by Central Pollution Control Board. The salient findings are:

- There are 18 Pellatization plants spread across eastern region of which 9 have been commissioned and only 5 were found operating. The installed capacity varies between 0.07 MMTPA to 10 MMTPA. The present production of pallets at these plantsis about 28.3 MMTPA, which will increase to 44.2 MMTPA in next year.
- Iron ore pelletizing processes/technologies may consists Shaft Furnace Process, Straight Travelling Grate Process, Grate Kiln Process, Cement Bonded Process-Grangcold Process, MIS Grangcold Process, Char process etc. and Hydrothermal Processes, COBO Process, MTU Process, INDESCO Process etc. However, Straight Travelling Grate Process and Grate Kiln Process are more popular and adopted are plletization plants.
- Straight grate system is a continuous parade of grate cars moving at constant speed through drying, indurations and cooling zones. Any change in one section effects the residence time in another. Grate-Kiln System has complete flexibility on speed control of grate, kiln and cooler.
- Grinding can be of wet or dry type for any of Pellatization technique. However, pellet plant mostly uses combination either of travelling grate with dry grinding or Grate Kiln with wet grinding technology.
- The power consumption in dry grinding is 20 % more than wet grinding process however, additional power requirement for pumping, filtration and dewatering in wet process exceeds the total power consumption per ton of grinding. The Wet grinding system generates filter cake which requires partial drying to provide a product suitable for the subsequent balling operation.
- The dry grinding followed by green ball formation works at 90 % efficiency where as in wet grinding due to agglomeration of green balls it works at 60 % efficiency.
- The total energy consumption per Ton of pellets in Travelling grate using dry grinding and Grate Kiln wet process are 221808 Kcal/T and 230000 K Kcal/T respectively.

- Sources and type of environmental Pollutants at Palletisation plant with respective emission control system mainly adopted are as below:

Unit	Pollutant	Pollution Control Equipments
Ore dryers	Particulate Matter, NOx	Cyclones, wet Scrubber (thickener and filter for scrubber water treatment and use in mixer) followed by Stack.
Dry Grinding	Particulate Matter, NOx	Cyclones and bag houses followed by Stack
Wet Grinding	Suspended Solids in wastewater	Effluent Treatment Plant
Balling	Particulate Matter	Dust extraction
Indurating unit	Particulate Matter, SO_2, NO_x, HF, Heavy Metal, PAH, PCDD/PCDF	Separate ESP for Stack for PM and flue gas treatment system for specific pollutant.
Hardening & Screening	Particulate Matter	Cyclones, Wet Scrubber or ESP

Considering the vast amount of iron ore fines and rejects generated and increasing demand for the pellets by sponge iron plants as well as blast furnaces, it is imperative that more & more pellatization plants for resource utilization will flourish at Iron Ore Mining areas. The guideline of best practices along with specific environmental standard is quite essential for better regulation of these industries.

10.4.2 Potential of Waste Tyres as Alternate Resource

India produced approximately 45 million light & heavy Tyres during financial year 2009-10 and is among the fastest growing automobile market in world. Used tyres from automobile sector possess utilisation potential as alternate resource. Worldwide, many energy intensive sectors are utilizing its potential by adopting the proven technology and sound environmental practices. In India, waste tyres are used for manufacturing of low cost products through small setup in unorganized sector. Prevailing management practice of waste tyre involves partial utilisation of its potential and after their useful life, finds its way to municipal waste. Such wastes are subjected to open air burning or after decomposition, has potential to contaminate soil and groundwater, resulting in corresponding human health hazards and adverse impact to local environment. A study was conducted by Central Pollution Control Board to explore the present waste tyre trade chain, its

utilisation scenario, and potential of its commercial exploitation within and outside the existing framework. The salient findings are as below:

- Tyre consists mainly organic materials having high carbon content (85%) and high calorific values (>7000 kcal/kg). Other components also have great reuse and recycle potential. Appropriate management and utilisation of end-of-life tyres has advantage like reduction in waste volume at disposal, fossil fuel substitution, reduction in GHG gases, etc.
- The major stake holder involved in management of used tyre were identified at Kolkata megacity along with assessment of its utilisation options, disposal and management, through questionnaire survey, field visits and interaction. Waste mapping and assessment of trade value chain vis-à-vis other environmental friendly options were also evaluated for their viability.
- Tyre industry is dominated by replacement market, therefore it was imperative to assess the average time of replacement and other affecting factors. Retreaded tyres have about 80% life than new tyres, and are very common in commercial vehicles. The average tyre replacement period in Indian condition for a passenger vehicle varies between 3-4 years whereas for commercial vehicle it lies between 2.5 - 3 years. On an average after a lag period of 3-4 years new tyre gets exhausted and are available for its secondary use. The percentage waste tyre contributed by different category of vehicles based on study survey is presented in Figure 10.2.

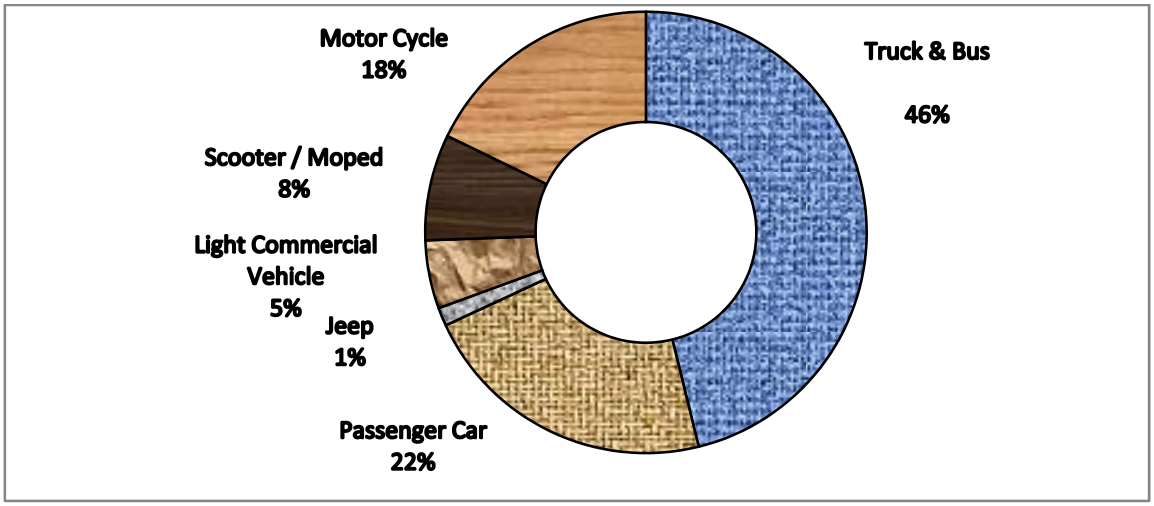

Figure 10.2 : Percentage Waste tyres contributed by various Categories of vehicles

- Used/Waste tyre utilisation market is highly unorganized and involves small setups in the country therefore; it was challenging to identify all stakeholders. Interaction with identified major stakeholders like retreading units, repairing shops and second hand tyre product manufacturers revealed that a reasonable material flow chain is operative, but capital availability and logistic factors are

the governing factor for their operation. A trade value chain is also in place, but is completely dependent on the material collecting entities. The waste tyre material flow observed during the study is presented in Figure 10.3.

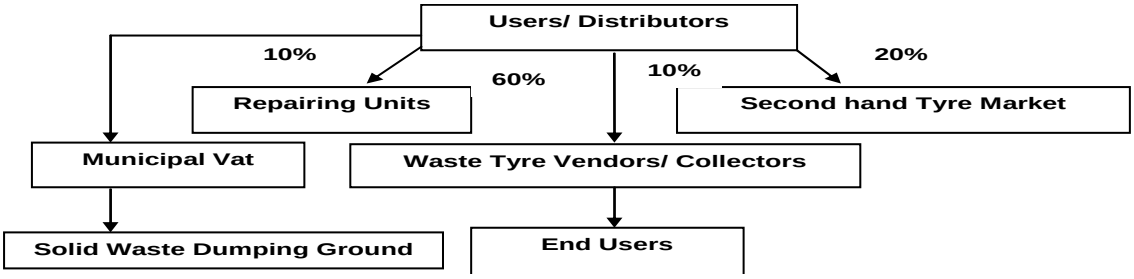

Figure 10.3 : Typical Waste tyres material flow

- During the study, about 20 retreading units in and around Kolkata were inspected. It was found that on an average retreaded tyres are approximately 40% cheaper than the new tyres, whereas its life is 80% of the new. Heavy vehicle tyres are subjected to maximum retreading of two times. Retreading is negligible for passenger cars and three wheelers / Two Wheelers tyres. Retreading process also generates tyre waste in form of tyre chips or large pieces of tyre strip, generally disposed off to low lying areas or sold to vendors for fuel and other uses.
- Waste tyre vendors pass such waste to end users like Road contractors, Rubber Product Manufacturing units, Metal Recovery Units, Small scale Industries etc. A significant portion finds its way to municipal waste. The material flow and percentage values of their contribution as assessed during the study is depicted in Figure 10.4.

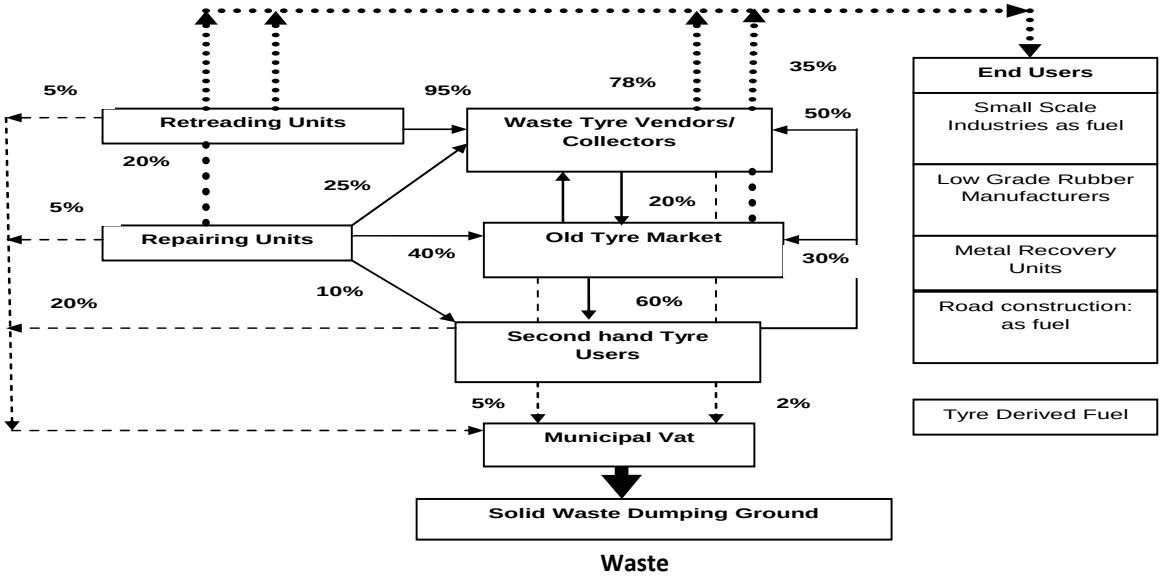

Figure 10.4: Material flow and percentage values of their contribution during waste tyres recycling

- Potential use of waste tyre in cement plant is an accepted practice worldwide, but it is yet to be explored to its true potential in the country. The major bottlenecks identified comprises lack of perennial and viable supply chain, competition from low cost product manufacturers situated close to the generation point, availability of cheaper fuel options and lack of commitment and comprehensive approach by the cement sectors.

- The feasibility study of used tyre utilisation at Integrated cement plant that adopting a Milk Run Model of waste collection economically and logistically viable sustainable supply chain for a maximum lead distance of 400 Km and modification/addition/alternation required at the cement plant are save of the factors to be streamlined. The third party involvement for intermediate collection and processing facilities will encourage utilisation of waste tyre among other potential users as well promote credible supply chain.

- It was found that approximately 12 – 15% reduction in green house gas emission can be achieved by utilizing the potential of waste tyres as supplement along with conventional fuel in the Cement plant.

- Other alternate option of waste tyre utilisation involves tyre derived fuel for medium and small scale industries, reclamation of other constituents of tyres, like steel, carbon black, light oils etc. Such facilities are yet to make their way due to highly competitive cost.

With potential to save valuable natural resources in environmentally sound manner and reduce GHG emission, a systematic awareness and inclusive approach is required for creating a sound material movement chain of waste tyres among stakeholders especially from unorganized sector. This will facilitate environment friendly management practices to the prevailing system as well as enlarge the potential of its uses in various energy intensive industries and processes.

10.4.3 Environmental Status of Automobile Centres

Automobile Servicing and Repairing Units (ASRU) belongs to Orange category of industry owing to its moderate pollution potential. With rapid growth in Indian

Figure 10.5 : Washing of vehicles at automobile servicing & repairing unit

automobile sector these units started mushrooming in and around almost all urban centres in India with less emphasis on pollution prevention measures. The study has been undertaken by Central Pollution Control Board a study to carry out a baseline survey on Environmental status of automobile centres at Kolkata metropolitan Area and covered all type of automobile servicing units. Pollution abatement and control strategies, practices and their operational and maintenance aspects were assessed through questionnaire survey and later through field verification. The following are the salient observations:

- The water consumption pattern varies with types of vehicle. The average consumption observed was 200-300 L for four wheelers, 500-550 L for heavy vehicles and 30-50 L for Two/ Three wheelers.

- Only 30% units were found with scientifically designed Waste Water treatment facility, while remaining 70% units either had made some partial arrangement or discharging without proper treatment. The water quality characteristics varied significantly.

- No specific management plan observed to avoid evaporation loss from solvent based liquids. Empty containers in most cases were stored in open along with other waste material. Closed Paint booths are present in most of the units fitted with PCDs but were found inadequate in comparison to the demand.

- None of the units had taken any specific measure for dust control in work zone area. Some has made provision of natural or forced ventilation.

- No specific measures adopted to control emissions from engines and as a result Indoor air Quality gets affected.

- Old vehicles with Ozone depleting substances (ODS) based refrigerant are being serviced by some of the ASRUs.

- With increasing demand, ASRUs are expanding their operation in outskirt of city away from residential areas; however most old units are operating in densely populated areas. Noise pollution due to denting, repairing and bodyworks within their workshop is of concern.

- The solid waste generated comprises mainly metal scrap, Glass, Paper, Wood, Plastic, Batteries, Waste Tyres etc and varies between 80-100 Kg/day for metal scrap and about 30-50 Kg/month for other wastes depending on number of vehicles and types of repairing undertaken. The solid wastes generated are

usually sold to scrap dealers, whereas tyre and battery are either returned to customer or recyclers/reusers.

- The empty containers of used chemicals and paints were found stored in open instead being segregated and stored in closed area. Mostly these empty containers are either sold to scrap buyers or disposed to Municipal vat.

- The automobile units generate used engine oil; brake oil, and other lubricants categorized as Hazardous waste.. Some units are selling such Hazardous waste to authorized recyclers, but majority of units are disposing it to unauthorized traders. Quantity of used oil generation varies between 10 L/day-90 L/day depending upon number of servicing attended. On an average, 2-4 L of used engine oil is generated for each change of oil for four wheelers.

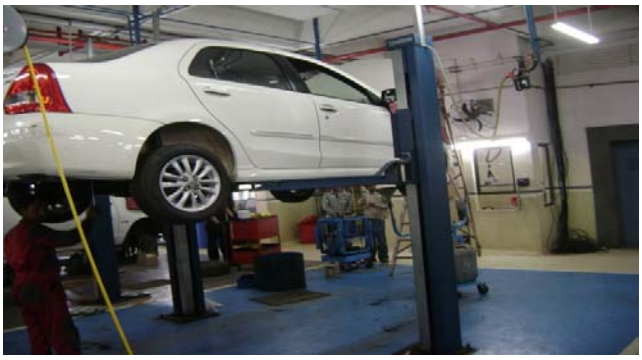

Figure 10.6: Servicing of vehicle at ASRU

- Oil soaked cloths, rags, gloves, paint booth filters, oil filters, ETP sludge are also categorized as Hazardous waste and are mostly disposed to municipal vat or burnt in open. Only in few cases, paint booth filters are sent to the TSDF.

The study reveals that the level of awareness regarding good environmental management practices and measures to be adopted for pollution abatement and control to meet stipulated norms is grossly inadequate among automobile servicing and repairing centres. Few initiatives have been taken for wastewater management. No major initiatives or concerns were found to address air and noise pollution. Waste segregation, resource recovery, proper storage and their management are other concerns which pose a threat of contamination to adjoining environment. Considering the present status of automobile service and repairing centers, the need of workable comprehensive guideline for environmental management practices are required along with a awareness among all stakeholders.

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CHAPTER XI

PROSECUTIONS LAUNCHED, CONVICTION SECURED AND DIRECTIONS GIVEN FOR CLOSURE OF POLLUTING INDUSTRIES

11.1 ENVIRONMENT SURVEILLANCE SCHEME (ESS)

Under ESS activities, highly polluting industrial units falling under 17 categories of industries are selected through usage of ESS Software, especially developed for surprise inspection / monitoring to check the compliance of consent conditions, standards, CREP, etc. ESS inspections are conducted through six Zonal Offices of Central Pollution Control Board located at Bangalore, Vadodara, Lucknow, Bhopal, Shillong and Kolkata. The database of industries from which the units are selected for inspections, consists of the region-wise industries in these six zones.

Under ESS programme 265 industries were inspected during year 2011-12. State-wise numbers of industries inspected during the year are presented in Table 11.1.

Table 11.1: State wise ESS inspections during year 2011-12

S. No.	State/UTs	No. of ESSInspections
01.	Andhra Pradesh	16
02.	Arunachal Pradesh	2
03.	Assam	14
04.	Bihar	6
05.	Chhattisgarh	12
06.	Dadar & Nagar Haveli	--
07.	Gujarat	14
08.	Haryana	4
09.	Himachal Pradesh	--
10.	Jharkhand	2
11.	Karnataka	12
12.	Kerala	12
13.	Madhya Pradesh	20
14.	Maharashtra	32
15.	Manipur	--
16.	Meghalaya	7
17.	Mizoram	--
18.	Odisha	4
19.	Puducherry	--
20.	Punjab	4

21.	Rajasthan	**16**
22.	Sikkim	**--**
23.	Tamil Nadu	**08**
24.	Tripura	**--**
25.	Uttar Pradesh	**28**
26.	Uttarakhand	**8**
27.	West Bengal	**36**
28.	Goa	**4**
29.	Delhi	**4**
Total		**265**

Based on the inspection reports, Directions/ Advices are issued to the concerned SPCBs/Industries depending upon severity of violations either under Section 18(1)(b) of the Water (Prevention and Control of Pollution) Act, 1974/ the Air (Prevention and Control of Pollution) Act, 1981 or under Section 5 of Environment (Protection) Act, 1986. The details about the action taken against defaulting industries by Central Pollution Control Board during year 2011-12 are presented in Table 11.2.

Table 11.2: Summary of action taken against defaulting industries during year 2011-12

Year	No. of directions issued to the units under Section 5 of The Environment (Protection) Act, 1986			No. of directions issued to the SPCBs/PCCs for units under section 18(1)(b) of the Water Act / Air Act		
	No. of Directions for compliance	No. of Directions for Closure	Total	No. of Directions for compliance	No. of Directions for Closure	Total
2011-12	79	18	97	48	6	54

11.1.1 Inspection for registration as Hazardous Waste Recyclers

During the year 2011-12, various units submitted their application for permission to use Hazardous Waste in the processes. Joint inspection with respective State Pollution Control Board was undertaken at these units.

11.1.2 Inspection of Municipal Solid Waste (MSW) Processing Facility at Chandigarh

During the year 2011-12, Green-Tech Fuel Processing Plant, Chandigarh (a unit of M/s Jaiprakash Associates Limited) was inspected. The salient observations of the inspection are mentioned below:

a. The plant processes 300 TPD of Municipal Garbage generated at Chandigarh and producing Refuse Derived Fuel. (RDF), about 70 TPD through pelletisation Technology.
b. The process involves Segregation of MSW, Manually, Mechanically, Separation of magnetic material, Homogenization of segregated Product, Drying of homogenous material, Segregation of Inerts, Shredding of RDF.
c. Refuse Derived Fuel (RDF) possesses a calorific value of 3100KCal/ Kg. The unit uses RDF for in-house consumption, by co-incinerating it with other fuels.
d. The plant is using hot air dryer for removal of the moisture which reduces volume and weight of the product. The hot dryer is connected with multicyclone, wet scrubber & activated carbon system which is attached with common stack of height 30m to arrest particulate matter, odour and flue gas emitted through stack.

Figure 11.1 : Pelletized RDF Fuel

Figure 11.2: Process units of Municipal Solid Waste processing facility

e. The segregated inert material was also reportedly being used as an additive for brick manufacturing.

11.1.3 Direction issued to small scale industries and CETPs

During the year 2011-12, CPCB issued directions to 9 CETPs and 2 tanneries under Section 5 of The Environment (Protection) Act 1986 and issued directions under Section 18 (1) (b) of the Water (Prevention and Control of Pollution) Act, 1974 to concerned SPCBs with reference to 7 CETPs and 16 tanneries, and under Section 18 (1) (b) of the Air (Prevention and Control of Pollution) Act, 1981 to concerned SPCBs with reference to clusters of stone crushers in Sonebhadra district (U.P.) and clusters of stone crushers in Nashik district (Maharashtra).

11.2 HON'BLE COURT CASES

During the year 2011-12, following Court cases were followed up:

- **Special Civil Application No. 5986 of 2010**

The matter is between Shri Vipulkumar Ramjibhai – Petitioner(s) v/s Union of India through Secretary & 3 – M/s. Electrotherm (I) Ltd., As per the Hon'ble High Court order, the CPCB inspected the premises of M/s. Electrotherm (I) Ltd., about air, water and noise pollution and submitted the report at Hon'ble High Court of Gujarat, Ahmedabad.

- **Special Civil Application No. 7125 of 2010**

The matter is between Shri Arjanbhai Sidibhai Patat and Shri Malabhai Arjanbhai Patat v/s State of Gujarat through Secretary, Environment & Forest, Govt of Gujarat, Gandhinagar, and others regarding pollution caused by M/s. Ambuja Cement Ltd., Taluka Kodinar, Dist Junagadh. As per the order, ambient air, groundwater and soil monitoring of the area surrounding M/s. Ambuja Cement, Tal. Kodinar, Dist. Junagarh were carried out between 10th Oct. to 14th Oct. 2011. The report was submitted to the Hon'ble High Court.

- **Special Civil application No. 12823 of 2010**

The matter is between Shri Balubhai Manjibhai Kachadiya & 7 v/s State of Gujarat and others regarding pollution caused by Final Effluent Treatment Plant (FETP) operated by M/s. Narmada Clean Tech Limited (Formerly BEAIL), FETP, Ankleshwar.

As per the direction of the Hon'ble High Court, inspection-cum-monitoring was carried out between 07th April to 08th April, 2011, and subsequently during 06-07 June, 2011 and 25-26 July, 2011. The monitoring was carried out for ambient air, noise and wastewater jointly with Gujarat Pollution Control Board, Regional Office, Ankleshwar. The Reports were submitted to the Hon'ble Court in time, the matter is pending.

- **Writ Petition (PIL) No. 89 of 2011**

The matter is between Magod Vriksh Utpadak Co Operative Society Ltd., Village Magod, Ta & Dist Valsad V/s Government of India, through the Secretary and 5 others, against M/s Atul Ltd., Atul, Dist. Valsad regarding effects of emission of

pesticide (2,4-D, Glyphosate) on plants/crops grown in the nearby villages. The matter was earlier investigated based on complaint received from Shri Nirav Desai, Chairman, Magod Vriksh Utpadak Co Operative Society Ltd., Village Magod, Ta & Dist Valsad through MoEF, New Delhi regarding effects of emission of pesticide (2,4-D, Glyphosate) on plants/crops grown in the nearby villages. Subsequently, when matter is admitted in the Ho'ble High Court, as per order, an affidavit on behalf of Respondent No.4 Central Pollution Control Board was submitted to the Hon'ble High Court of Gujarat based on above investigation.

- **Writ Petition (PIL) No. 131 of 2011**

The matter is between Patel Vijaybhai Bhagubhai & Ors V/s State of Gujarat, through Industries Department & Ors regarding setting up of new TSDF at Village Kocharva, Ta-Pardi, Dist Valsad (near Vapi) by M/s Vapi Waste and Effluent Management Company Ltd. Vapi). An Affidavit was submitted on behalf of Central Pollution Control Board, Respondent No. 7.

- **Criminal complaints under Section 15 & 16** Read with Section 19 (a) of the Environment (Protection) Act, 1986 have been filed:

  - In the Chief Judicial Magistrate/Judicial Magistrate, Silvassa (criminal complaint No. 153 of 2009)against M/s Jakson & Company, Delhi (Diesel Generator Set manufacturing company) , its works and officials;
  - In the Chief Judicial Magistrate/Judicial Magistrate, Daman (criminal complaint No. 90 of 2009) against M/s Ankitech Pvt Ltd (Diesel Generator Set manufacturing company), its works and officials,

The cases were filed due to violation of environmental regulation notified under the Environment (Protection) Amendment Rules and its amendments on Noise limit for generator sets run on diesel. The cases are being followed up.

- Counter affidavit has been filed in the Hon'ble High Court Allahabad with reference to PIL 4003 of 2006 regarding pollution problem in River Ganga during Magh Mela.
- Writ Petition No. 12212 of 2011 (M/s S.N.G Mercantile Pvt. Ltd., v/s Union of India & others) has been dismissed by the Hon'ble High Court Allahabad, Lucknow bench by its order dated 15.12.2011.
- Counter Affidavit has been filed Hon'ble High Court Allahabad with reference to PIL No.20257 of 2010 (Society of Voice of Human Rights and Justice (Regd.) v/s Union of India and others) regarding pollution problem due to industries and mobile towers.

- Counter affidavit has been filed in Hon'ble High Court Allahabad, Lucknow bench with reference to Writ Petition No. 5570 (M/B) of 2011 regarding pollution problem of River Ganga due to disposal of dead bodies, sewage and industrial effluent , run-offs from chemical fertilizers & pesticides.

11.3 PUBLIC COMPLAINTS / VIP REFERENCES

Apart from following-up various pollution related issues with concerned SPCBs/PCC, variouspublic complaints received with VIP reference were attended. Suitable actions including directions to the concerned industries/SPCBs have been taken on the basis of the findings of the inspections. Details of matters investigated are as below:

- **M/s Atul Ltd., Atul, Dist. Valsad**
  The matter was investigated based on compliant received from Chairman, Magod Vriksh Utpadak Co Operative Society Ltd., Village Magod, Ta & Dist Valsad through MoEF, New Delhi regarding effects of emission of pesticide (2,4-D, Glyphosate) on plants/crops grown in the nearby villages. The matter was investigated in two stages i.e. visit to the area & industry and monitoring in the area & industry. The inspection-cum-monitoring was carried out, as industrial monitoring (emission, wastewater), ambient air quality monitoring, soil and plants sampling, during 10-12.05.2011 for relevant parameters including 2,4-D and Glyphosate. M/s SGS India Pvt Ltd, Chennai, are E(P)A approved laboratory, was engaged for the sampling and analysis of 2,4-D and Glyphosate. The violations under the Environment (Protection) Rules and consent conditions by said industry were communicated to Gujarat Pollution Control Board to issue direction to the industry for compliance.
- **M/s Gujarat Fluorochemicals Limited, Ranjitnagar, Dist Panchmahal**
  M/s Gujarat Fluorochemicals Limited Ranjitnagar, Dist. Panchmahal and surrounding area was investigated with respect to a complaint with VIP reference regarding air and groundwater pollution caused by the industry. The complaint is made by General Secretary, Congress Committee Ghoghamba Block, Ghoghamba, Dist. Panchmahal. The investigation was carried out in two stages i.e. groundwater monitoring inside and outside the premises of the industry on 29.04.2011 and industrial monitoring (source emission/air and wastewater) on 20.05.2011 on surprise basis. Based on the report, direction under Section-5 of the Environment (Protection) Act, 1986 was issued to the industry by Central Pollution Control Board for implementation of recommendations. The directions were revoked based on compliance.

- **M/s Amoli Organic Ltd., Luna, Ta- Padra, Dist. Vadodara**
  M/s Amoli Organic Ltd, Luna, Ta-Padra, Dist. Vadodara was visited on 23.12.2011 with reference to complaint from Farmers Action Group (FAG), Vadodara through MoEF, New Delhi regarding pollution caused by the industry. Wastewater monitoring was carried out. Report submitted to with recommendations. GPCB has been asked to direct the industry to take necessary action on the recommendations. Gujarat Pollution Control Board (GPCB) had issued direction under section 33 A of the Water (Prevention & Control of Pollution) Act, 1974 on the matter, and further revoked the direction for three months based on submission of action plan, undertaking and bank guarantee by the industry.

- **M/s Tata Chemicals Ltd (Cement Plant), Mithapur**
  M/s Tata Chemicals Ltd, Mithapur was visited during 01.02.2012 to 02.02.2012 with respect to complaint by regarding pollution caused by the said industry. During inspection, source emission monitoring at cement plant and wastewater monitoring was carried out. Wastewater is mostly generated from Soda Ash plant. Particulate Matter (PM) at some stacks and suspended solids & ammonical nitrogen in effluent at final outlet were found exceeding emission norms and discharge norms respectively prescribed by GPCB. Based on the report, Gujarat Pollution Control Board (GPCB) has been asked to ensure implementation of the recommendations made during inspection.

- **Pollution in River Kolak, Vapi-Daman Area**
  In pursuant to complaints from Pollution Control Committee (PCC), Daman and others regarding pollution in River Kolak, a team of the officials of Central Pollution Control Board (CPCB) and Gujarat Pollution Control Board (GPCB) carried out industrial monitoring at Bill Khadi River Kolak on 28.02.2012 & 29.02.2012.
  It has observed that river Kolak is contaminated due to industrial/domestic wastewater from GIDC Vapi/Chharwada area through Bil Khadi (natural drain) and wastewater from industries directly discharging into the river. Plastic waste and scrap handling activities on the bank of Bil Khadi are also contributing pollution.

- **M/s Ultratech Cement Ltd., Jafrabad, Gujarat (M/s Narmada Cement Works and M/s Gujarat Cement Works)**
  M/s Ultratech Cement Ltd. Jafrabad, Gujarat was visited during 04.01.2012 to 05.01.2012 as a follow up of two complaints against are regarding

pollution caused to the villagers of Jafarabad, death of wild animals due to mining activities and failure to fulfill the promise of employment to land losers. The other complaint was regarding the pollution caused on the local ecology and failure to fulfill the socio-economic developmental activities of the surrounding villages of Rajula and Jafarabad Taluka. Suitable actions including directions were given to Gujarat Pollution Control Board based on the findings of the inspection and monitoring results.

- **Environmental Pollution by Tar mixing plants & stone crusher plants adjoining to Shree Nasik Panchvati Panjrapole farm at Chunchale village (survey no. 78, 59) & Sarul village (survey no. 159, 152, 37) of Nasik District, Maharashtra**

  Tar mixing plants & stone crusher plants adjoining to Shree Nasik Panchvati Panjrapole farm at Chunchale village & Sarul village of Nasik District was visited during 05.07.2011 to 06.07.2011 with respect a complaint made by the trust. In this regard, the ambient air quality monitoring was carried out at two locations during 05.07.2011 to 06.07.2011. I.e. first location was inside the Chunchale farm and away from the stone crushers in upwind side to find out the reference status. The second location of monitoring was close to boundary of Farm and stone crusher cluster to find out the impact & contribution of stone crushing activities in vicinity. Based on the findings and recommendations, the Central Pollution Control Board has issued direction to Maharashtra Pollution Control Board U/s 18 (1) (b) of The Air (Prevention & Control of Pollution) Act, 1981.

- **M/s Hanjer Biotech Energies Pvt. Ltd. Village Nakrawadi, District Rajkot**

  Complaints against the unit was received by MoEF, CPCB and GPCB for non-compliance of Rules & Regulations. Central Pollution Control Board also received a reference dated 02.05. 2011 from Hon'ble Member of Parliament, Rajkot regarding pollution created by said unit. In this regard, Gujarat Pollution Control Board carried out joint inspection with The Central Pollution Control Board in said unit on 17.06.2011. Based on the major findings and recommendations GPCB has initiated actions against the unit and Rajkot Municipal Corporation under the provisions of the Air (Prevention and Control of Pollution) Act, 1981 and the Environment (Protection) Act, 1986.

- **M/s Polygel Industries Pvt. Ltd. Village Dadra, Dadra & Nagar Haveli (UT)**

  M/s Polygel Industries Pvt. Ltd. was visited during 15.09.2011 with respect to a complaint from save Silvassa Front regarding the gross violation of the Pollution Control Committee (PCC) license/ norms and bypassing the ETP effluent into agricultural fields and contamination of ground water. In this regard, surprise inspection was undertaken to assess the ground reality of issues mentioned in complaint. During inspection, effluent, process and source emission monitoring was carried out. Based on the major findings and recommendations, the Central Pollution Control Board has issued direction U/s 5 of The Environment (Protection) Act, 1986 and a time bound action plan along with bank guarantee of Rs. 10 Lakh for ensuring the compliance of the directions.

- **M/s Indian Oil Corporation Ltd (IOCL). Gujarat Refinery, Vadodara**
  Central Pollution Control Board has received complaint against Indian Oil Corporation Limited (IOCL) Refinery from Hon'ble Member of Parliament (Loksabha) regarding two fire incidents. The first fire incident occurred on 22.06.2011 at the borrow pit located inside the premises of IOCL, near Karachiya Village but located outside the battery limit of the refinery, the second fire incident took place in the River Mini near Amrapura Village, Vadodara District on 31.10.2011. In this regard, Central Pollution Control Board carried out joint inspection with GPCB at Karachyia Railway Yard, which was discharging the wagon tanker washings into the IOCL's borrow pit during 23.06.2011. Visited the site where fire incident took place in the Mini River near Amrapura Village during 03.11.2011 and also visited refinery in order to assess the existing effluent management system & Effluent Channel Project (ECP), where the IOCL is discharging the treated effluent. Based on the major findings and recommendations, Central Pollution Control Board has issued direction U/s 5 of The Environment (Protection) Act, 1986 to M/s Indian Oil Corporation Ltd. subsequently, the Gujarat Pollution Control Board also issued directions U/s 33 A of The Water (Prevention & Control of Pollution) Act, 1974. The railways has established ETP at yard near Karachiya village. M/s IOCL took-up the task of cleaning of river Mini and also taken-steps to improve wastewater management.

- **River and Solid Waste Management In Gorakhpur (Uttar Pradesh)**
  Consequent upon the complaint received regarding pollution problem in Ami River on 29.04.2011. A team of CPCB officials visited the area during May 02-04, 2011. The team monitored water quality of Ami River at different

locations and inspected identified industries. Based on the inspection, directions were issued to industries contributing pollution load to river Ami. The UP Pollution Control Board was also requested to monitor the water quality of river Ami to ensure that effluent treatment plants are operated by the industries and to direct the stakeholder for preparing an action plan for treatment of domestic waste. The investigation was mainly focused on following issues:

a. Assessment of Pollution control measures adopted by the industries discharging effluent in to Ami River
b. Status of compliance of directions issued by CPCB
c. Water Quality Status of Ami River
d. Water Quality Status of Ramgarh Lake
e. Management of Municipal Solid Waste in Gorakhpur City
f. Management of BMW Management in Gorakhpur City

Figure 11.3 : Graphical sketch of the area sharing River Ami, Various industries at Gorakhpur (U.P.)

* * *

CHAPTER XII

FINANCE AND ACCOUNTS

CENTRAL POLLUTION CONTROL BOARD , DELHI-110032

RECEIPTS & PAYMENT ACCOUNT FOR THE YEAR ENDED 31.032012

(AMOUNT IN Rs.)

RECEIPTS	CURRENT YEAR	PREVIOUS YEAR	PAYMENTS	CURRENT YEAR	PREVIOUS YEAR
I. Opening Balance			I. Expenses		
a) Cash in hand	(219)	(219)	a) Establishment Expenses (corresponding to schedule 20)	338,388,037	296,340,425
b) Bank Balances			b) Administrative Expenses (corresponding to schedule 21 and 24)	251,613,127	242,777,153
i) In current accounts	242,068,934	53,596,949			
ii) In deposit accounts	9,080,000	9,580,000	II. Payments made against funds for various projects		-
iii) Savings accounts	-	-	Project Exps	19,879,408	8,199,579
II. Grants Received					
a) From Government of India	620,000,000	620,000,000	III. Investments and deposits made		
b) From State Government	-	-	a) Out of Earmarked/Endowment funds	-	-
c) From other sources	286,258,630	239,779,483	b) Out of Own Funds (Investments-Others)	-	-
					-
			IV. Expenditure on Fixed Assets &Capital Work in progress		-
			a) Purchase of Fixed Assets-Own fund	31,586,042	128,089,805
III. Income on Investments from			b) Purchase of Fixed Assets- Earmarked/Endowment funds	-	480,218
a) Earmarked/Endow. Funds	7,147,979	348,431			
b) Own Funds	-	-	V. Refund of surplus money/Loans		
			a) To the Government of India	-	-
IV. Interest Received	-		b) To the State Government	-	-
a) On Bank deposits	4,025,215	1,931,166	c) To other providers of funds	-	-
b) Loans. Advances etc.	-	240,810			-
			VI. Finance Charges (Interest & Bank charges Sch 23)	42,980	32,038
V. Other Income (Specify)					
a)Misc Receipts and Licence Fees	-	160	VII. Other Payments (Specify)		
b) INCOME FROM ROYALTY, PUBLICATIONS ETC.	827,341	1,088,310	Advances and other payments (net)	-	43,668,241
c) OTHER INCOME	3,429,748	2,248,068	Project Advance	132,275,284	
d) Misc Income	230,402	-			
VI. Amount Borrowed	-	-			-
			VIII. Closing Balances		-

Contd.

RECEIPTS	CURRENT YEAR	PREVIOUS YEAR	PAYMENTS	(AMOUNT IN Rs.) CURRENT YEAR	PREVIOUS YEAR
VII. Any other receipts			a) Cash in hand	(219)	(219)
a) Other Receipts	38,278,014	41,828,545	b) Bank Balances	-	-
b) Sale of Fixed Assets	1,470,673	94,471	i) In current accounts	365,371,802	242,068,934
c) Advances and other payments (net)	15,634,217		ii) In deposit accounts	89,294,474	9,080,000
			iii) In Savings account	-	-
Grand Total	1,228,450,934	970,736,174	Grand Total	1,228,450,934	970,736,174

Schedules 1 to 26 forming part of accounts are annexed

As per our report of even date
For K.M.Agarwal & Co.
Chartered Accountants
Reg. no. 000853N

K.M. AGARWAL & CO. Chartered Accountants 36, N.S. Marg, Darya Ganj, N. Delhi-2

(C.P. Mishra)
M.NO. 073009
Partner
Place: Delhi
Date: 22 March, 2013.

For Central Pollution Control Board

(Ajay Tyagi)
Chairman

(J.S. Kamyotra)
Member Secretary

(M.S.Bansal)
Accounts Officer

(Mohan Kapur)
Assistant Accounts Officer

CHAPTER XIII

ANNUAL ACTION PLAN FOR THE YEAR 2011-12

The Central Pollution Control Board (CPCB) is coordinating with the State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs) on execution of nation-wide programmes relating to abatement of pollution. The activities mandated to CPCB are diversified in nature which includes; monitoring of ambient environment, formulation of standards and guidelines and providing implementation status reports to the Ministry of Environment and Forests (MoEF) on rules framed under the Environment (Protection) Act, 1986 etc.

The Annual Action Plan (Work Plan) of CPCB for year 2012-13 has laid emphasis on strengthening of environmental monitoring network, carrying out random checks of industries for compliance verification, review of existing standards and development of new standards and inventorisation of wastes. Capacity development of SPCBs through trainings and organizing/participation in mass awareness programmes will be the continued activity. Specific attention has been given on bringing environmental quality data in public domain though web-site dissemination.

13.1 SALIENT ACHIEVEMENTS OF YEAR 2011-12

13.1.1 Assessment of Pollution:

- Carried out water quality monitoring at 2000 stations covering 445 rivers, 154 lakes, 12 tanks, 78 ponds, 41 sea water, 45 drains, 10 water treatment plants and 807 wells.
- Carried out ambient air quality monitoring (AAQM) at 523 stations covering 215 cities/towns in 26 States & 5 Union Territories.
- Set-up a National Ambient Noise Monitoring Network (NANMN) comprising 35 stations located in 07 cities (Delhi, Mumbai, Hyderabad, Lucknow, Kolkata, Bangalore, and Chennai).
- Out of 15 CAAQMS installed by CPCB, 12 CAAQMS are being operated under operation & maintenance contract and 3 CAAQMS are being operated by CPCB. Data of all fifteen CAAQMS is being uploaded in CPCB's website on regular basis.
- A seminar on "Persistent Organic Pollutants (POPs) Overview, Monitoring and Analysis" has been organized.
- Ambient Dioxin/Furan monitoring has been undertaken during Pre-Deepawali, Deepawali & Post-Deepawali at two locations in Delhi.

- Assessment of vehicular pollution at tourist and religious places.
- Development of Guidelines for Environmentally Sound Management of End of Life Vehicles (ELVs).

13.1.2 Industrial Pollution Control:

- Environmental standards have been notified in respect of "Soda Ash and Pesticide industries". In addition, Emission Standard of Petrochemical Industries is in the process of notification by MoEF.
- On Random basis ESS inspections carried out in industries falling under 17 categories of highly polluting industries and Directions have been issued to non-complying industries under Section 5 of The Environment (Protection) Act, 1986.
- Report on computation of Societal Risk Abatement with regard to Dioxins and Furan Emission Standards for common hazardous waste incineration finalized and published.

13.1.3 Waste Management:

- Co-processing of hazardous and non-hazardous incinerable waste tried in Cement kilns. Trial runs for co-processing of distillery spent wash has been conducted in cement kilns and draft Guidelines for Co-processing of Distillery Spent Wash prepared.
- CPCB has been identified as Project Executing Agency of MOEF for remediation of hazardous waste contaminated sites funded under the National Clean Energy Cess Fund.
- Study to assess the environmental impact of ship breaking activities was conducted and monitoring of soil and water quality has been carried and report published.
- Field Study on Life Cycle Assessment of plastic products completed.
- Carried out inspections of TSDFs, CBMWTFs and SLF (as a follow up of Directions issued).
- Completed study on quantification and characterization of plastic waste in 60 major cities in India. Report is under finalization.
- Published a document on Guidelines for Environmentally Sound Management of mercury waste generated from health care facilities (HCFs).
- Provided status of implementation of Plastics Waste Management Rules, 2011 to MoEF for compliance of Hon'ble Supreme Court's Order and Committee on Assurance.

13.1.4 Training, Mass Awareness and Environment Data Bank:

- Implementation of Raj-Bhasha (Hindi) in CPCB and organizing Hindi Diwas, Workshop and Training Programmes for CPCB officials.
- Seven hundred ninety (790) episodes under Paryavaran Darshan Programme on regional environmental issues were shown by 18 Regional Kendras and DD-National.
- Nine (9) technical and scientific reports, 1 newsletter and 07 other reports have been published on various subjects.
- An integrated software for creating Environmental Data Bank (EDB) and system for CAAQMS data communication have been developed
- Conducted 20 National Training Programmes on various environmental pollution and prevention areas. These programmes were attended by staff of CPCB and SPCBs. In addition, 8 training programmes on various administrative matters for non-technical staff of CPCB.
- A real-time data is being received from various locations from four major suppliers of monitoring equipments/instruments.

13.2 THRUST AREAS FOR YEAR 2012-13

The current financial year i.e. 2012-13 is the 1st year of 12th Five Year Plan (FYP). A complete document on 12th FYP has been presented to MoEF detailing year-wise activities. During year 2012-13, no new activity will be undertaken. However, schemes/activities started during year 2011-12 will be continued during the year 2012-13, these are as under;

- Operation & Maintenance (O&M) of Water Quality Monitoring (WQM) at 2500 Stations.
- O&M of Ambient Air Quality Monitoring Stations at 700 Stations.
- Noise monitoring at 35 locations in 07 cities.
- Continuous Ambient Air Quality Monitoring (CAAQMS) will be continued in some cities.
- Up-gradation of 4 Zonal Office laboratories at par with Head Office.
- Ensuring compliance of Municipal Solid Waste (MSW) Rules, 2000 in States and Union Territories.
- Ensuring compliance of Plastic Waste (Management and Handling) (Amendment) Rules, 2011 in States and Union Territories through State Pollution Control Boards (SPCBs), Pollution Control Committees (PCCs) and Municipal Authorities for Hon'ble Supreme Court's Order & Committee on Assurance.

- Implementation of co-processing of incinerable hazardous and non-hazardous waste including plastic waste in cement kilns, thermal power and steel plants.
- Encouraging use of plastic waste in road construction.
- Inventorisation of Bio-medical Waste, Hazardous Waste, Battery Waste & E-waste generation in major cities in India.
- Monitoring compliance in CETPs, STPs, CBMTFs, TSDFs etc.
- Monitoring Environmental Quality in 43 critically polluted industrial clusters (CEPI).
- Development of standards for 'Red category' of industries.

13.3 BUDGET ALLOCATION FOR YEAR 2012-13

Table 13.1 : Project Head-wise Budget Allocation for 2012-13

Project Heads	Title of the Project Head	Allocation (Rs. in Crores)		
		Head Office	Zonal Offices	Total
I	Pollution Assessment (Survey and Monitoring)	18.15	0.755	18.905
II	Scientific and Technical Activities and R&D	1.2325	2.2335	3.466
III	**Industrial Pollution Control (standards, Enforcements and Technologies):**	NA	NA	NA
	a) Standard Development	2.4385	NIL	2.4385
	b) Enforcement	6.2888	6.145	12.4338
	c) Technology	0.59	NIL	0.59
IV	**Training and Awareness:**	NA	NA	NA
	a) Training Programmes	0.53	0.09	0.62
	b) PR, Mass Awareness Programmes & Hindi	0.56	0.075	0.635
	c) Library	0.10	0.057	0.157
V	Information (Database) Management	0.44	0.254	0.694
VI	Waste Management and Urban Pollution Control (Plastic Waste, Hazardous Waste, Municipal Solid Waste, Bio-medical waste, E-waste & Vehicular Pollution)	1.9407	0.12	2.0607
	Total	**32.2705**	**9.7295**	**42.00**

* * *

CHAPTER XIV

OTHER IMPORTANT ACTIVITIES DEALT BY CENTRAL POLLUTION CONTROL BOARD

14.1 INSPECTION AND MONITORING OF SEWAGE TREATMENT PLANTS (STPs)

During the year 2011-12, Inspection and monitoring studies of sewage treatment plants (STPs) located in various states were carried out to assess the performance status.

14.1.1 Sewage Treatment Plants of Central Zone (Madhya Pradesh)

Central Pollution Control Board Zonal Office Bhopal has inspected 10 Sewage Treatment Plants (STPs) during 27th October to 5th November 2011 which were constructed under the NRCP and located in various cities of Madhya Pradesh. The waste water samples were collected to assess the quality of the sewage which is being discharged in various rivers in different cities.

Table 14.1 : Status of the sewage treatment system established under NRCP in Madhya Pradesh

River	City	Treatment type	Capacity	Status	Remarks
Khan	Indore	UASB	78 MLD	Operational	Fund problem, optimization required.
		UASB	12 MLD	Operational	
Kshipra	Ujjain	Waste Stabilization Pond	52 MLD	Operational	Not maintained properly, due to non-availability of sufficient fund for O&M of STPs and housekeeping.
		Karnal Technology	---	Operational	
Chambal	Nagda	Karnal Technology	---	Non-operational	System not in operation, due to fund crisis and lack of coordination between Govt. departments.
Tapti	Burhanpur	Waste Stabilization Pond	06 MLD	Non-operational	Not in operation due to shortage of fund.
Betwa	Bhopal	Waste	08 MLD	Operational	Operational but

		Stabilization Pond			proper maintenance required.
	Vidisha	Karnal Technology	---	Operational	
Wainganga	Chhapara	Karnal Technology	1.2 MLD	Non-operational	Not in operation due to shortage of fund.
	Keolari	Karnal Technology	0.75 MLD	Non-operational	

Note: New STPs at Rewa, Chitrakoot & Hoshangabad are proposed.

Observations:

1. There is lack of co-operation between Municipal Corporation and PHED officials at many places for Operation and Maintenance of STPs because of non-availability/shortage of fund and technical expertise. State Government should provide the required fund for maintenance, smooth operation and restarting of the scheme.
2. At most of the STPs, treated water is discharged in the same nallah at the downstream. The treated water should be used for irrigation and construction purpose by the local body.
3. Most of the STPs are receiving plastics waste in sewage causing hindrance in effective Operation and maintenance of system.
4. In Karnal Technology based STPs, the condition of the plantation area was not satisfactory and excess hydraulic loading of sewage is being applied which is overflowing and discharged to water bodies downstream.
5. Frequent transfer of staff/engineers is affecting regular operation and maintenance of STPs.
6. In most the STPs sampling and monitoring of treated effluent is not being done. Moreover, testing of effluent for fecal coliform is not being done in most of the plants which is one of the most important indicators in abatement of pollution. Lack of proper laboratories/analytical facility at site was another area that needs attention.
7. Sludge handing appeared to be most neglected area in STPs operation. Biogas generated from UASB reactors or sludge digesters is not being collected & utilized for the designated purpose.
8. Alternate power supply facility was not available at most STPs.

14.1.2 Sewage treatment plants in West Zone (Gujarat and Maharashtra)

In Gujarat, there are around 16 sewage treatment plants located in various cities viz. Vadodara (5), Surat (6), Ahmadabad (4), and Rajkot (1). In Maharashtra, there

are 23 STPs located in various cities. The Central Pollution Control Board has monitored STPs located at Ahmedabad, Vadodara and Surat in Gujarat and STP at Nasik at Maharastra during the year 2011-2012. The monitoring results are presented in Table 14.2.

Table 14.2: Performance status of Sewage Treatment Plants of Gujarat

Location	Parameters								
	pH	TSS	TDS	COD	BOD	NH_3-N	O&G	% Removal COD	% Removal BOD
STP Vasana Ahmedabad (**15.11.2011**)									
Inlet	7.3	148	--	259	115	15.9	--	60.23	76.52
Outlet	7.3	34	--	103	27	23.9	--		
STP Pirana, Ahmedabad (**15.11.2011**)									
Inlet	7.2	206	--	421	191	23.2	--	69.83	81.68
Outlet	8.1	72	--	127	35	27.9	--		
STP of M/s Anjana,Surat (**03.02.2012**)									
Inlet	7.8	191	999	578	269	24.6	--	92.21	96.65
Outlet	7.3	24	826	45	9	50.96	--		
STP Bhesan, Surat (**03.02.2012**)									
Inlet	7.5	96	1171	257	107	21.84	--	91.83	95.33
Outlet	7.9	5	1316	21	5	10.36	--		
STP Atladra, Vadodara (**22.02.2012**)									
Inlet	7.8	279	1015	582	153	--	--	92.44	98.76
Outlet	6.8	0.8	600	44	1.9	--	--		
STP Sayajiganj, Vadodara (**22.02.2012**)									
Inlet	7	532	4468	322	32	--	14.1	76.40	94.66
Outlet	6.8	120	900	76	1.71	--	2		
STP Tarasali, Vadodara (**27.03.2012**)									
Inlet	6.7	371	1200	678	48	--	13	53.98	15.21
Outlet	6.9	117	1200	312	40.7	--	--		
STP Kapurai, Vadodara (**27.03.2012**)									
Inlet	6.6	293	679	289	33.3	--	9	75.02	79.58
Outlet	7	112	470	72	6.8	--	1		
STP Gajarawadi, Vadodara (**27.03.2012**)									
Inlet	6.8	263	857	536	47.6	--	18.4	93.96	95.17
Outlet	7.4	70	576	32	2.3	--	0.3		

Table 14.3: Performance Status of STPs in Maharashtra

Location	Parameters							
	pH	TSS	COD	BOD	TKN	NO_3-N	% Removal COD	% Removal BOD
STP Tapovan (78MLD) **24,25.11.2011**								
Inlet	6.93	157	211	62	20.8	1.01	78.20	72.58
Outlet	6.9	20	46	17	9.1	0.15		
STP Tapovan (52MLD) **24,25.11.2011**								
Inlet	6.93	53	78	15	16.7	0.47	61.54	46.67
Outlet	7	12	30	8	15.2	0.13		
STP Chachedi Nashik (22MLD) **24,25.11.2011**								
Inlet	6.96	73.6	128	32.3	19.2	0.09	85.94	76.16
Outlet	7.28	12	18	7.7	12.9	0.19		
STP Trayambakeshwar (1MLD) **24,25.11.2011**								
Inlet	6.9	165	312	132	18.6	0.17	21.47	22.73
Outlet	7.05	157	245	102	12	0.15		

The following STPs across Gujarat and Maharashtra were also inspected to assess and monitor the status of Sewage Treatment Plant (STP) financially assisted by Ministry of Environment & Forests (MoEF).

STPs in Gujarat:

- Ahmedabad Municipal Corporation (AMC) 106 MLD-UASB type STP at Old Pirana, Pirana road, Behrampura, Ahmedabad
- Ahmedabad Municipal Corporation (AMC) Old Vasna, 126 MLD -UASB type STP at Nr. V. N. Bridge, Narol Sarkhej Highway, Ahmedabad

STPs in Maharashtra :

- Karad Nagar Parishad (KNP), Dist. Satara, Maharashtra
- Kolhapur Municipal Corporation, Kolhapur, Maharashtra
- Sangli Miraj Kupwad Municipal Corporation (SMKMC), Sangli, Maharashtra

14.1.3 Sewage Treatment Plants in South Zone

Thirty seven (37 nos) STPs constructed under NRCP in south zone were monitored during October-November, 2011 as directed by Parliamentary Standing Committee of MOEF. Out of 37 STPs inspected only 22 STPs were operational and among the

22 STPs that are operational only 17 STPs were complying inland surface water and agricultural standards (Figure 14.1).

Status	STP Nos.
Total no of STP's monitored	37
No of STP's Not Constructed	Shimoga, Nanjaungud, Attapur, Bhavani, Erode, Kerala
No of STP's Partly Constructed	3
No of STP's Not Operational	6
No of STP's Operational	22

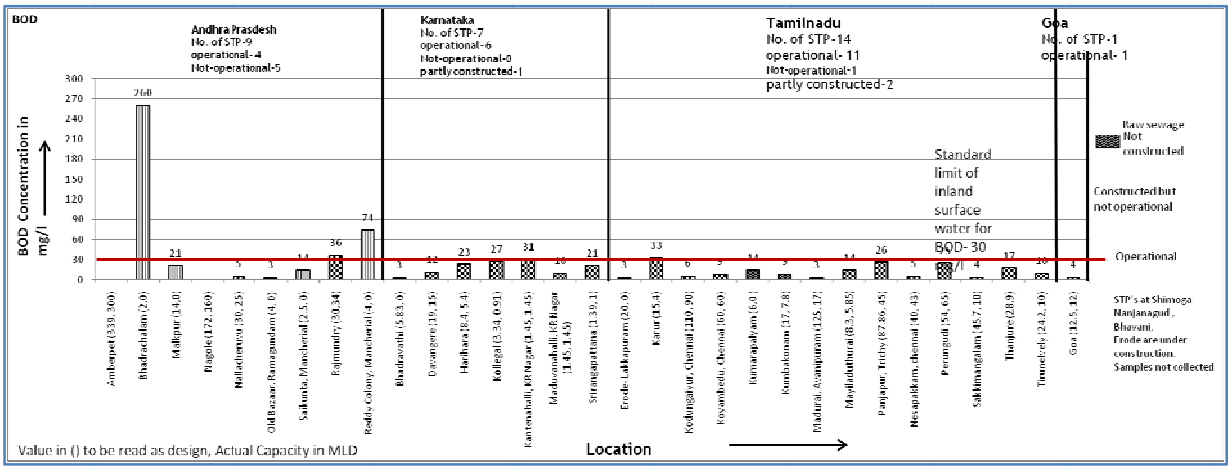

Figure 14.1 : Status of STP's Under NRCP in South Zone year 2011-12- BOD

14.2 INSPECTION 2 MONITORING OF COMMON EFFLUENT TREATMENT PLANTS

14.2.1 Sewage Treatment Plants of North Zone (Uttar Pradesh & Haryana)

Table 14.4: Status of common Effluent Treatment Plant and Sewage Treatment Plants at Uttar Pradesh & Haryana

STP 2 Capacity	Technology Adopted	Observations
State : Uttar Pradesh		
CETP, Banthar (Unnao) **Capicity 4.5 MLD**	Activated Sludge Process with extended aeration	• Sludge generated from the CETP is disposed in TSDF, Banthar • Unit is adding Pseudomonas Bacteria approx. 20 lt. /day at the inlet of CETP for

STP 2 Capacity	Technology Adopted	Observations
	system.	augmentation of microbial process. • Unit has installed V-Notch and Online flow meter at the outlet of CETP for measuring discharge of treated effluent. • CETP has developed the laboratory for the analysis of basic environmental parameters. • Treated effluent from CETP is discharged into pucca drain which meets to City Jail drain and ultimately meets to River Ganga after traversing approx. 20 km from CETP. • Upgradation of Primary Effluent Treatment Plant (PETP) installed in all the member units (19 nos.) are in progress.
78 MLD STP Dhandupura **Capacity 78 MLD**	Up flow Anaerobic Sludge Blanket (UASB)	• STP has no proper screening system at the MPS. It was observed that construction of automatic screening system was under progress. • One of the reactors was found non-functional due to maintenance. • Unit has two polishing ponds but one of the polishing ponds was observed under repairing. • Gas collection pipe of the reactor was observed damaged at many places. Due to this, unit is not collecting gas and it is emitted in environment. • Treated sewage discharged to the nalla is open upto 5 Km, which is used by the farmers for the irrigation. Thereafter treated sewage travels approx 5 Km in closed pipe and finally discharged into Yamuna River.
STP Pilakhar **Capacity 10 MLD**	Oxidation Pond	• Average inlet flow of the STP was 08 MLD. • Total sewage generation of the area is approx. 25 MLD while STP is treating only 10 MLD and the remaining is discharged through the bypass drain into Yamuna River without treatment. • Industrial effluent from Pilakhar and Nunhai area is discharged into sewer and reaches

STP 2 Capacity	Technology Adopted	Observations
		STP. • Treated sewage from STP is discharged into Pucca drain which meets to River Yamuna after traversing approx distance of 100-200 m. Farmers use this water for irrigation purpose.
STP-Burhi Ka Nagla **Capacity 2.25 MLD**	Oxidation Pond	• No flow at the inlet of STP was observed. • Bypass arrangement was made at the Nagla Burhi nalla. Possibility of discharge of excess sewage cannot be ruled out. • It was observed that Oxidation Pond was damaged at many places and cleaning of oxidation pond was not done since long time.
STP-Jaganpur (Dayal Bagh) **Capacity 14 MLD**	Up flow Anaerobic Sludge Blanket (UASB)	• The average inflow of sewage is 07-12.5 MLD. • The coarse material collected through screening and grit chamber is reportedly disposed off in open area in the plant premises. • The Sewage Pumping Station (SPS) has five no. of pump (3X95 HP, 2X25 HP) which are pumping sewage by tapping Burhi ka Nagla nalla.SPS has two DG set with capacity of 160 KVA. During inspection, log book of SPS operation not being properly maintained. • STP has 62.5 KVA capacity dual fuels DG set using Diesel and Bio-Gas as fuel. During inspection, Bio-gas generated is flaring in the atmosphere. • STP has environmental lab for the analysis of the environmental parameters. • STP has a DG set with capacity of 15 KVA for lab. • STP is located at the bank of Yamuna River. Treated sewage is partially sent for irrigation in Dayal Bagh area and remaining is discharged into Yamuna River.
STP-Bichpuri	Up flow Anaerobic	• STP was under construction.

STP 2 Capacity	Technology Adopted	Observations
Capacity 40 MLD	Sludge Blanket (UASB)	
STP-Kalideh **Capacity 0.5 MLD**	Oxidation Pond	• The STP-Kalideh is based on Oxidation Pond Technology with installed capacity of 0.5 MLD. • STP was not in operation during inspection. The STP is not in operation since 1-1.5 month as informed by the pump operator • The pumping station consists of five pumps with capacity of 10 HP. One DG set with 30 KVA is provided during power cut. No proper record is maintained for the operation of pumping station and STP. • The sewage is directly discharged into Yamuna River through pucca drain, which is approx. 500 m away from the STP. • Anaerobic Pond is abandoned and new pumping station was under construction in place of anaerobic pond for the new STP located at Gopal Garh (approx. 3.5 km away).
STP-Pagal Baba **Capacity 4 MLD**	Oxidation Pond	• STP lacks proper maintenance.. • Sludge accumulated in the ponds was not removed since long time. • The plant has no proper screening system at the inlet • Treated sewage is used for the irrigation and excess sewage is discharged into Yamuna River after traversing approx. 1 Km.
STP-Masani Nalla **Capacity 13.5 MLD**	UASB Up flow Anaerobic Sludge Blanket	• The STP is operated with excess load. • MPS has pumped approx. 19.80 MLD of sewage to the STP. • The generation of sewage is much higher than the operating capacity of STP. Masani nalla is not completely tapped, hence large quantity of untreated sewage is discharged into Yamuna River without treatment.
STP-Laxmi	Up flow	• One pump in Bengali Ghat MPS and four

STP 2 Capacity	Technology Adopted	Observations
Nagar **Capacity 14.5 MLD**	Anaerobic Sludge Blanket (UASB)	pumps in Dairy Farm MPS were not found working. • Sludge generated during cleaning of Oxidation Pond is disposed off in open area near STP. • Due to leakage of raising main of Dairy Farm MPS, sewage was bypassed to Yamuna River through Abmakhar Nalla. • Treated sewage is used by the farmers for irrigation and excess sewage is discharged into Yamuna River after traversing a distance approx. 1.5 Km.
STP Etawah **Capacity 10.445 MLD**	Oxidation Pond	• Part of the nalla is tapped through MPS and remaining/excess sewage is discharged through drain. As per records available with STP, approx. 10.26 MLD of sewage is pumped to STP. • Treated sewage from the STP is discharged into nalla which meets with Yamuna River after traversing approx. 1.5 Km. • The STP has two DG set with capacity 180 KVA each for power backup.
STP, Fatehgarh **Capacity 2.7 MLD**	Oxidation Pond	• The STP Fatehgarh has one Sewage Pumping Station (SPS) located at Cantt. Area and Main Pumping Station at Hathikhana. • The STP receives sewage generated from Ambakhar colony, Bholepur, Naglading, Jainvi Road, Hathikhana, Poolmandi, Nawadia, Civil line area. The sewage is then pumped to STP Fatehgarh. • As informed by the STP representative, MPS is operated only 16 hr. /day due to power failure. The STP has no power back up arrangement. During power failure, sewage is bypassed and discharged into River Ganga after traversing approx. 1-2 Km. The bypassed untreated sewage is reportedly used for the irrigation by the farmers.

STP 2 Capacity	Technology Adopted	Observations
State : Haryana		
Chhachhrauli (Yamuna Nagar) **Capacity 100 MLD**	Oxidation Pond	• Stagnant water is observed in oxidation ponds with algal growth. • No outlet of the oxidation ponds was observed. • No boundary wall constructed around oxidation ponds
Gharaunda (Karnal) **Capacity 3.0 MLD**	Oxidation Pond	• Non operational since last 6 months. • Sewage from main pumping station is directly bypassed into the Ganda Nallah, which ultimately joins River Yamuna • Stagnant water is observed in oxidation ponds with algal growth.
Gohana (Sonipat) **Capacity 3.50 MLD**	Oxidation Pond	• Screen bar & Grit chamber not constructed to remove suspended solids, plastic rags and floating matters. • No flow measuring device installed at inlet and outlet. • Stagnant water was observed in oxidation ponds. • It was observed that the untreated water is directly utilized for irrigation/ farming
Indri (Karnal) **Capacity 1.50 MLD**	Oxidation Pond	• Flow measuring device not installed at inlet &outlet. • Stagnant water with algal growth was observed in oxidation ponds. • Facultative & Maturation ponds are being used for fish farming on contract basis.
Karnal Capacity 40 MLD	Up-flow Anaerobic Sludge Blanket (UASB)	• Proper flow measuring system not installed at the outlet • Feeding pipelines in the reactor were leaking at several places. • Stagnant water with algal growth was observed in polishing ponds.
Chhachhrauli (Yamuna Nagar) **Capacity 1.0 MLD**	Oxidation Pond	• Stagnant water is observed in oxidation ponds with algal growth. • No outlet of the oxidation ponds was observed.

STP 2 Capacity	Technology Adopted	Observations
		• No boundary wall constructed around oxidation ponds
Gharaunda (Karnal) **Capacity 3.0 MLD**	Oxidation Pond	• Non operational since last 6 months. • Sewage from main pumping station is directly bypassed into the Ganda Nallah which ultimately joins the River Yamuna • Stagnant water is observed in oxidation ponds with algal growth.
Gohana (Sonipat) **Capacity 3.50 MLD**	Oxidation Pond	• Screen bar & Grit chamber not constructed to remove suspended solids, plastic rags and floating matters. • No flow measuring device installed at inlet and outlet. • Stagnant water was observed in oxidation ponds. • The untreated water is directly utilized for irrigation/ farming
Indri (Karnal) **Capacity 1.50 MLD**	Oxidation Pond	• Flow measuring device not installed at inlet &outlet. • Stagnant water with algal growth was observed in oxidation ponds. • Facultative & Maturation ponds are being used for fish farming on contract basis.
Karnal **Capacity 8.0 MLD**	Oxidation Pond	• Flow measuring device not installed at inlet & outlet. • Facultative & Maturation ponds are being used for fish farming on contract basis.
Palwal **Capacity 9.0 MLD**	Oxidation Pond	• Proper flow measuring system not installed at the outlet • Partially treated effluent is used for irrigation • Effluent discharged into Gochi drain which joins Yamuna River.
Panipat **Capacity 10.0 MLD**	Up-flow Anaerobic Sludge Blanket (UASB)	• Feeding pipelines in the reactor were leaking at several places. • Inconsistent flow at inlet adversely impacts UASBs performance. • Average flow into the plant is 17 MLD which is more than the designed flow.

STP 2 Capacity	Technology Adopted	Observations
Panipat **Capacity 35.0 MLD**	Up-flow Anaerobic Sludge Blanket (UASB)	• Feeding pipelines in the reactor were leaking at several places. • Inconsistent flow at inlet adversely impacts UASBs performance. • Average flow into the plant is 45 MLD which is more than the designed flow. • The plant was observed receiving sewage of exceptionally high strength, which shows the presence of industrial effluents in sewerage system.
Radaur (Yamuna Nagar) **Capacity 1.0 MLD**	Oxidation Pond	• The receiving main sewerage pipeline was reported to be damaged. • Stagnant water is observed in oxidation ponds with algal growth. • No outlet of the oxidation ponds was observed. • No boundary wall constructed around oxidation ponds
Sonepat **Capacity 30.0 MLD**	Up-flow Anaerobic Sludge Blanket (UASB)	• Sludge Blanket was not proper in UASB reactors due to Oil film • No sludge seen in the sludge drying beds • Bio-gas was not generated due to excess feeding into in the reactors which reduces the Hydraulic Retention Time. • Treated domestic waste is discharged into Drain No. 6 which meets River Yamuna through Drain no.08
Yamuna nagar / Jagadhari Capacity 10 MLD	Up-flow Anaerobic Sludge Blanket (UASB)	• Feeding pipelines in the reactor were leaking at several places. • Stagnant water was observed in oxidation ponds with algal growth.
Yamuna nagar / Jagadhari **Capacity 25.0 MLD**	Up-flow Anaerobic Sludge Blanket (UASB)	• Both UASB reactors were under repair during inspection • Average flow into the plant is more than the designed flow of 25 MLD which is directly discharged into drain. • The treated effluent was black in color with oil layer indicating the presence of industrial effluent
Unit 1- 30 MGD	Moving Bed Bio-Film Reactor (MBBR)	SS BOD Inlet 267 259 Outlet 19 33 % Reduction 92 87

STP 2 Capacity	Technology Adopted	Observations
Unit 2 - 15 MGD	Activated Sludge process (ASP)	• Non-operational during inspection • ASP Unit was not being properly operated & the wastewater is being discharged without treatment
3 - BRD (Base Repir Depot), Air Force Station Capacity 5 MGD	Up-flow Anaerobic Sludge Blanket (UASB)	SS BOD Inlet 263 372 Outlet 26 32 % Reduction 90 91 • Anaerobic filters were found choked during inspection • Bio-gas generated from the plant was observed being flared
Raipur Kalan Capacity 5 MGD	Up-flow Anaerobic Sludge Blanket (UASB)	SS BOD Inlet 257 253 Outlet 31 33 % Reduction 87 86

14.2.2 Common Effluent Treatment Plants Central Zone (Madhya Pradesh)

CETP Govindpura: To treat the effluent of high BOD discharging through agro & milk based industries, a 900 KLD capacity UASB based CETP is in Govindpura industrial area of Bhopal. Generally CETP received 350 KL to 450 KL of waste water per day throughout the year. Performance Evaluation of CETPs was undertaken between 20th March 2012 & 24th May, 2012. The performance evaluation indicate that treatment units are performing well as the TSS, COD & BOD removal was 93.35%, 95.94% & 98.23% respectively. However Chloride removal (<20%) was found very poor (Table 14.5)

Table 14.5: Performance Evaluation of CETP at Govindpura

S.No.	Location	pH	Total Solids	TSS	COD	BOD	Cl	O&G
1.	**CETP inlet**	7.06	5104	1340	2690	1130	760	--
2.	**Before digester (buffer tank outlet)**	7.14	4110	1173	1770	679	722	--
3.	**After digester (inlet to aeration tank)**	7.40	1392	70	152	39	756	--
4.	**CETP final outlet**	7.51	1229	89	109	20	610	NT

Remark : All values are in µg/l except pH.

14.2.3 Common Effluent Treatment Plants (CETPs) in West Zone

Ankleshwar and Vapi

Quarterly monitoring of CETPs at Ankleshwar, Panoli, FETP Ankleshwar and CETP Vapi and River Damanganga was carried out by Central Pollution Control Board.

Final Effluent Treatment Plant (FETP) is provided principally for polishing treatment of effluent from three industrial areas viz Ankleshwar, Panoli and Jhagadia in fulfilment of order of Hon'ble High Court, Gujarat. The treated effluent is discharged into Arabian Sea through 53 km long pipeline (on shore-43.6 km and 9.37 km off shore).

Maharashtra:

Almost all the monitored CETPs at Maharastra are non-compliant to prescribed norms. Most of the CETPs are having primary & secondary treatment only Tertiary treatment is not adopted except few CETPs like Vapi, Ankleshwar in Gujarat. Inlet effluent characterization indicates significant deviation (upward) from the inlet design norms causing shock loads occasionally. In most of the cases, there is heavy hydraulic shock load in monsoon season due to lack of separation of storm water & industrial waste water. This results in flooding of CETP units & thus improper treatment. Influent (to biological treatment) characterization indicates non-amenability to biological treatment (due to high COD/BOD ratio and high TDS) in case of Chemical CETPs handling only industrial effluent. Many CETPs started taking domestic sewage to improve amenability to biological treatment in recent times.

14.2.4 Common effluent treatment plants in South Zone:

There are more than 40 CETPs in operation in southern zone covering industrial clusters such as tannery, textile, electroplating, etc.

CETP at Bangalore (KARNATAKA)

CETP at Veersandra Industrial area was established in the year 2007 with 10 life members to treat the effluent generated from small scale industries especially Electro Plating units located in and around Veerasandra Industrial Area, Bangalore. The CETP has capacity to treat 20 KLD of effluent and presently it is receiving Chrome based effluent of ≈ 61.5 KL/month and Acid Base Effluent of ≈

61.5 KL/month through tankers (500 litre or 1000 litre capacities). Following observations were made during inspection / monitoring:

- The CETP comprises two separate storage tanks of capacity 10 m3 each to store Chrome based and Acid based raw effluent respectively, two Neutralization tanks, two lamella clarifiers, semi-treated effluent tank followed by sand filter & pressure filter, final treated effluent tank and sludge drying beds.
- No records are maintained regarding characteristics of raw effluent received. The operator is giving chemicals dosage by checking pH. After neutralization heavy sludge was found in the neutralization tank which indicates excess dosing of chemicals.
- As per Karnataka State Pollution Control Board consent condition the operator is required to have laboratory to verify the characteristics of effluent, but no laboratory found existing, the operator has pH meter and some jars, during inspection the pH meter was also under repair.
- The connecting pipe lines of lamella clarifier for drawing clarified water was found disconnected. After neutralization the effluent is pumped to lamella clarifier and allowed for settling of solids, after settlement the operator drawing settled sludge slurry as well as clarified effluent from the bottom of clarifier instead of allowing effluent to clarify from top of the clarifier.
- The two sludge drying beds were found totally filed with sludge slurry while other two sludge drying beds were totally filled with semi dried sludge. Huge quantity of sludge was lying under the shed as well as in storage yard.
- The final treated effluent having high TDS, Copper and Iron was being discharged by the CETP in violation of norms.

Neutralization tank of CETP

Lamella Clarifiers of CETP

Sand filter and pressure filter of CETP

Sludge drying beds of CETP

Semi dried sludge of CETP

Hazardous waste storage room of CETP

CETPs in Tamil Nadu:

The five CETPs viz. CETP Periya varikkam, CETP Walajapet, CETP, Aryampet and CETP Pallavaram located at Tamil Nadu were monitored during the year 2011-12.

The salient observations and monitoring results are as follows:

- Most of the CETP's are working in the range of 40 – 60% of its designed capacity.
- All CETP's are having chemical treatment and biological treatment system. All CETP's has installed Reverse Osmosis System followed by Multi Effect Evaporator to manage R.O. reject.
- In two CETP's, R.O. efficiency was found in the range 60-70% only. The 50% of secondary treated effluent was treated through R.O. the R.O. permeate being sent back to their member units and R.O. reject and remaining 50% secondary

treated effluent being discharged to nearby Nala which ultimately joins the Palar River.

- All CETP's have developed Secured Landfills (SLFs) to dispose Hazardous waste generated from their member units as well as to dispose sludge generated from CETP's. The SLF's are not having proper approach to dump the waste in scientific manner.

Ultra Filtration Plant of CETP

Reverse Osmosis Plant of CETP

Multi Effect Evaporator of CETP

Discharge of treated effluent into drain

Stagnated Effluent in Surrounding Area

Disposal of HW in unscientific manner

CETP at ANDHRA PRADESH

The performance evaluation of CETP at Jeedimetla, Hyderabad was undertaken during year 2011-12 and the salient / observations are as below:

- The CETP is receiving effluents from 169 member units comprising mainly Chemical, Pharmaceutical & Bulk Drugs. Though the designed capacity is 5000 m3/day, presently only < 2200 m3/day of effluent was found received for treatment.
- The Low TDS effluent received through tankers is discharged into equalization tank. After giving chemical dosage of Alum, Lime and polyelectrolyte, the effluent is pumped to primary clarifloculator. The clarified effluent is taken to buffer storage tank and then pumped to distribution tank to mix with sewage in the ratio of 1:3 to increase BOD to COD ratio. Then it is treated through Activated Sludge Process followed by two stage secondary clarifier and the final treated effluent is discharged through closed conduit to City sewer which ultimately goes to Amberpet STP.
- To treat High TDS effluent, the CETP has treatment system comprising equalization tank followed by VOC stripper, four stage Multi Effect Evaporator, Centrifuge and spray dryer. The condensate from MEE and residue from centrifuge is sent to Low TDS equalization tank for treatment. MEE Concentrate is further treated through spray drier to make salt.
- It was observed that concentrate from the MEE was stored in an open tank within the premises, which can cause seepage and ground water contamination.
- Old aeration tanks and clarifiers were found filled with effluent mixed with rain water.
- The sludge drying beds/storage tanks were found full and overloaded with primary and biological sludge and the transfer of the same to the TSDF was not effective. Dried sludge was stored haphazardly. Housekeeping in the sludge drying beds, storage area was found poor.

Effluent Received through Tanker

MEE Concentrate stored in open lagoon

Hazardous waste stored in open space

14.2.5 Study for documentation of global best practices in industrial wastewater treatment technologies and treated-effluent disposal/ reuse, with special reference to CETPs

Central Pollution Control Board (CPCB) has undertaken the study for documentation of 'The global best practices in industrial wastewater treatment technologies and treated-effluent disposal/reuse, with special reference to CETPs and to look into the costing and economic viability of those technologies in India in association with The Energy and Resources Institute (TERI).

The study was awarded and conducted during year 2011-12 and a draft report prepared which under revision.

14.3 PERFORMANCE MONITORING OF TREATMENT STORAGE & DISPOSAL FACILITY (TSDF)

Central Pollution Control Board, Zonal office Lucknow has undertaken inspection of TSDFs located at Himachal Pradesh and Uttar Pradesh during the year. The plantwize salient observations are in Table 14.6.

View of TSDF Cells at Nalagarh (H.P.)

Table 14.6:Performance Monitoring of Treatment Storage & Disposal facility at Himachal Pradesh & Uttar Pradesh

TSDF	Salient Observations
TSDF Nalagarh, (Himachal Pradesh)	• TSDF, Nalagarh is operated from 35.5 acre area caters to Himachal Pradesh state. • It has double liner system at the bottom and sides with provision to collect & treat the Leachate. • The total quantum of waste disposed in the landfill till February, 2012 was 35,600 MT. • It has its own Trucks/ Transportation system to lift the hazardous waste and follows the MoEF/ CPCB MANIFEST. • The TSDF facility is observed to be engaged in cleaning the

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<td>chemical containers/ drums and then reselling it to industry.
• A Leachate sump (4m x 2m x 4m) is made for Leachate collection. The characteristics of incoming leachate are as below:

<table>
<tr><td colspan="5">Parameters</td></tr>
<tr><td>pH</td><td>Conductivity</td><td>TDS</td><td>Phenols</td><td>COD</td></tr>
<tr><td>8.01</td><td>31.8 x10^3</td><td>20280</td><td>1.595</td><td>16764</td></tr>
</table>
* All values are in mg/l except pH, Conductivity

• A Multiple Effect Evaporator (MEE) (forced film - 2 stages) of 20m^3/day capacity is installed for treating effluent generated from various sources like Leachate, washing of truck tyres, vehicle & drums/ containers.

• The MEE concentrate is disposed off in the landfill.A boiler of 750 kg/hour capacity is used for steam generation with Furnace oil as fuel. No Air Pollution Control System (APCS) is installed. MEE condensate water is recovered and used for washing, gardening etc. The TSDF facility is having four Piezometeric wells (depth 100ft) for ground water monitoring.</td>
</tr>
<tr>
<td>TSDF, Banthar, (Uttar Pradesh)</td>
<td>• TSDF Banthar has three cells for the disposal of HW generated from appx. 50 industries.
• The size of cells is 1.25 lac m^3, 75000 m^3 and 75000 m^3.
• As per information given by the representative of TSDF,the approx. life of these shell are 15 years.
• At present two shells are working in which approx. 20,000 MT of HW is disposed of.</td>
</tr>
<tr>
<td>TSDF, Kanpur Dehat (M/s Bharat Oil and Waste Management Ltd.), Uttar Pradesh</td>
<td>TSDF, Kanpur Dehat installed capacity of 50,000 MT while the site area having capacity of 450000 MT. Total member of the TSDF are 424 units.
At present approx. 18,000 MT of Hazardous Waste is dispose off at TSDF Site.</td>
</tr>
<tr>
<td>TSDF, Kanpur Dehat (M/s Ramky Waste Management Pvt. Ltd.)
(Uttar Pradesh</td>
<td>TSDF, Kanpur Dehat has installed capacity of 30,000 MT/Annum and the capacity of shell which is used for Landfill after treatment is 20,000 MT/Annum with 25 Years life. TSDF site has an incinerator with capacity 02 MT/hr. Approx. 90,000 MT of HW is dispose off at this TSDF Site.</td>
</tr>
</table>

14.4 BIO-MEDICAL WASTE TREATMENT FACILITY

14.4.1 Bio Medical Waste Treatment Facility, North Zone

Table 14.7: Performance Monitoring of Common Bio-Medical Waste Treatment Facility at Chandigarh

CBWTF	Salient observations
CBWTF at Post-Graduate Institute of Medical Education Research (PGIMER), Chandigarh.	• During inspection, it was observed that segregation of the waste at the source was carried out at various wards of the hospital like advanced cardiac, pediatrics and, orthopedic. • Pathological laboratory waste was disinfected with 1% & 2% Sodium Hypo Chlorite solution or Bleaching Powder and discharged into the drain (sewer) • PGIMER, Chandigarh has installed a double-chambered incinerator of 200 kg/day capacity for treating incinerable bio-medical waste generated from hospital. The incinerator is connected to a stack of 30m height through a venturi scrubber. Regular Monitoring of incinerator not undertaken. • The temperature in Primary Chamber & Secondary Chamber was maintained 850°C & 1050°C, respectively. • The Scrubbing water is discharged directly into sewer without any treatment. • The facility is operating without valid consent under Water Act 1974 & Air Act 1981. • It was reported that glass waste, shrapnels, bottles and Plastic waste is disinfected, shredded and then sold out to registered recyclers. Incinerator ash was reportedly sent for land filling. However, no proper record of ash generation & disposal was maintained. • Records of waste collection and waste movements are maintained in all the sections of the unit. Logbook for the equipment and site records are maintained. • The facility is having open & closed storage vehicles to collect the waste from various sections of hospital, which are properly labeled with the safety codes. • The unit has no collection and treatment facility for wastewater generated from washing of vehicles, hospitals, floor washing etc

14.4.2 Bio Medical Waste Treatment Facility, Central Zone

There are 18 CBWTF in central zone of which 10 are located in Rajasthan, 07 in Madhya Pradesh and 01 in Chhattisgarh state. During the year four facilities were inspected & monitored by Central Pollution Control Board for verification of compliance of Bio Medical Waste Rules.

Table 14.8: Common Bio Medical Waste Treatment Facilities at Central Zone

S.No.	CBWTF	Capacity	No. of HCFs attached	No. of beds covered	Remarks
1.	M/s Hoswin Incinerators, Alwar	100 kg/hr	199	4000	Directions issued under Section 5 and facility has deposited Bank guarantee
2.	M/s Elite Engineers, Jabalpur		173	4172	Directions issued under section 5 for effective Operation & Maitenance
3.	M/s Hoswin Incinerator Pvt Ltd, Indore		350	8900	Directions issued under section 5 and later on facility complied the norms
4.	M/s Davis Surgico Ltd., Gwalior		182	3149	Directions issued under section 5 for effective Operation & Maintenance

TSDF Gudli, Udaipur:

The facility is to dispose 8,000 TPA of HW in direct landfill and 10,000 TPA of HW in landfill after treatment. The height of the SLF has been permitted up to 12 m with a slope of 1:3 by Rajasthan State Pollution Control Board. The consent to operate under Air & Water Acts have been valid up to 31.03.2011. About 454 units sending waste to TSDF. The year wise wastes received and disposed at SLF is presented in Table 14.9.

Table 14.9: Year-wise Hazardous Waste received and disposed off at TSDF, Udaipur

Year	Landfill after treatment (MT)	Direct landfill (MT)	Incinerable waste received (MT)	Total in MT
Gudli Go-down to March 2007	5614.879	1413.769	315.597	7344.245
April 2007 to March 2008	11549.865	1170.182	831.277	13551.324
April 2008 to March 2009	9226.916	759.141	0.00	9986.057
April 2009 to March 2010	10791.956	2231.435	0.00	13023.391
April 2010 to March 2011	15216.055	3214.082	0.00	18430.137
April 2011 to Nov. 2011	9303.759	1786.954	0.00	11090.713
Total	**61703.430**	**10575.563**	**1146.874**	**73425.867**

14.4.3 Common Bio-Medical Waste Treatment Facilities & Armed Forces' Health Care Establishments at Western Zone

With the objective to monitor the compliance of the provisions of the Bio-medical Waste (M&H) Rules, 1998, and to make specific suggestions/recommendations for improving the performance of the facilities. The Central Pollution Control Board Zonal Office, Vadodara carried out inspections of Armed Forces Hospital located Gujarat state as well as three Common Bio-medical Waste Treatment Facilities (CBMWTFs) located in the Maharashtra state as follows:

- Military Hospital, Ahmedabad (Gujarat)
- Mansai Biomedical Waste Enterprises Pvt. Ltd. (CBMWTF), Jalgaon, (Maharashtra)
- Watergrace Products BMW Management Project (CBMWTF), Nashik (Maharashtra)
- Superb Hygienic Disposals (India) Pvt. Ltd. (CBMWTF), Chandrapur (Maharashtra)

The inspections were also carried out to evaluate the compliance of Directions issued under Section-5 of the Environment (Protection) Act, 1986 against the following Health Care Facilities (HCFs) and CBMWTFs.

- Dhiraj General Hospital, Vadodara (Gujarat)
- Shree Krishna Hospital, Karamsad (Gujarat)
- New Civil Hospital, Surat (Gujarat)
- En-vision Enviro Engineers Pvt. Ltd. (CBMWTF), Surat (Gujarat)
- SembRamky Environmental Management Pvt. Ltd. (CBMWTF), Dist. Ahmedabad (Gujarat)

14.4.4 Common Bio Medical Waste Treatment Facilities at South Zone

Out of 36 Common Bio Medical Waste Treatment facilities in the southern states, the following units were monitored and action taken to ensure and implement proper management towards storage, treatment, disposal, documentation and operation & maintenance of unit.

Table 14.10: Common Bio Medical Waste Treatment 2 Disposal Facilities at South Zone

BMWTF	Inspection	Action Taken	Status
AWM Consulting Ltd, Kabaca (V), Yerpadu (M), Chittor (D). Andhra Pradesh	March 2012	Direction Issued in the month of December 2010 to submit time bound action plan and submit Bank guarantee	Unit has implemented all action plans and complied with all facilities. However during monitoring the particulate matter exceeded due to operation & maintenance fault, which is further being asserted.
Medical Waste Solutions, Kurnool Dist, Andhra Pradesh	February 2012	Follow up actions taken towards Direction Issued and proposed to issue direction for the additional non compliances	The unit has implemented all action plans and complied, the direction is revoked in April 2012.
Maridi Eco Industries Pvt ltd, Thadipatri mandal, Annadapur dist, Andhra Pradesh	December 2011	Direction Issued in November 2009. Time bound action plan is in progress	Closed due to their internal issues.
G.J Multiclave (India) Pvt. Kanchipuram Dist. Tamil Nadu	March 2012	Direction Issued to complete time bound actions and to deposit Bank Guarantee	The unit has implemented all action plans and compliance report forwarded to CPCB Delhi, during May 2012
SemRamkey Environmental Management Pvt Ltd, Bangalaluru-560	December 2011	Direction Issued to submit bank Guarantee and complete all time	The unit has implemented all action plans. Direction revoked in

BMWTF	Inspection	Action Taken	Status
043, Karnataka		bound actions by March 2011	April 2012.
KenBio Links, Vellore Tamil nadu	August 2011 & Jan-2012	Monitored, Direction issued on October 2011.	Follow up & actions taken reports forwarded during Jan-2012, unit implemented the action plan.
Shushrutha Bio-Medical waste Management Society, Shimoga, Karnataka	December 2012	Direction issued to comply with action plans	Implementation of action plans yet to be received.
Tamil Nadu Waste Management ltd	March 2012	Facility involved with fabrication works	Not monitored as no activities taken place at the facility and Waste routed to nearby facilities

Out of eight Common Bio-Medical Waste Treatment and Disposal Facilities inspected and monitored, three facilitators have fully implemented the action plans and complied with the Bio-Medical Waste Management & Handling Rules 1998 while three facilitators have partially implemented the Action plans.

14.5 BIO-MEDICAL WASTE MANAGEMENT

14.5.1 'Status on Bio-medical Waste Management Scenario'

As per the information received for the year 2010 from the State Pollution Control Boards / Pollution Control Committees (SPCBs/PCCs) and Director General of Armed Forces Medical Services (DGAFMS), the bio-medical waste management status in the Country is as follow:

- No. of healthcare facilities : 139594
- No. of beds : 1420563
- No. of Common Bio-medical Waste Treatment Facilities (CBWTFs) : 188 + 17 *(under Construction)*
- No. of healthcare facilities (HCFs) using CBWTFs : 98764
- No. of HCFs having treatment & disposal facilities : 20228
- No. of healthcare facilities applied for authorization : 77537
- No. of healthcare facilities granted authorization : 70800

14.5.2 Total No. of on-site treatment equipments installed (excluding CBWTFs):

- No. of incinerators
  i) With Air Pollution Control Device : 419
  (ii) Without Air Pollution Control Device : 273
- No. of autoclaves : 2710
- No. of microwaves : 179
- No. of Hydroclave : 13
- No. of Shredders : 4250

14.5.3 Total No. of treatment equipments installed at CBWTFs:

- No. of incinerators : 177
- No. of autoclaves : 161
- No. of microwaves : 10
- No. of Hydroclave : 5
- No. of Shredders : 170
- Quantity of bio-medical waste generated in Tonnes/day : 355 (approx.)
- Quantity of bio-medical waste treated in Tonnes /day : 302.0 (approx.)
- No. of HCFs violated BMW Rules : 6653
- No. of Show-cause notices/Directions issued to defaulter HCFs : 5829

There has been increase in number of common Bio-medical waste treatment facilities over the years and at present there are 205 CBWTFs (188 under operation + 17 under construction) so as to facilitate proper treatment and disposal of bio-medical waste in the Country.

14.5.4 Inspection/Evaluation of Health Care Facilities and Common Bio medical Waste Treatment Facilities on implementation of Bio-medical Waste (Management & Handling) Rules, 1998 MW Rules, 1998

- In compliance to Hon'ble High Court of Delhi order dated 18.07.2011 in the matter of W.P. (C) 6976/2008 filed by P.K.Nayyar and Others, a team comprising officials of Central Pollution Control Board & Delhi Pollution Control Committee conducted inspection as well as monitoring of CBWTF operated by M/s Synergy Waste Management (P) Ltd., New Delhi on 27/07/2011 and filed the status report to the Hon'ble High Court**.** However, in order to re-confirm the stack emission results observed during the said monitoring, CPCB along with DPCC conducted re-monitoring of the stack emission of the incinerator installed at CBWTF on 29/08/2011 and filed the stack monitoring results to Hon'ble High Court of Delhi. Presently matter is subjudice.
- The CBWTFs namely 1) M/s Instromedix (India) Pvt. Ltd., located at Jaipur

& 2) M/s Vulcan Waste Management Pvt. Limited, located at Gurgaon, Haryana were inspected & stack emission monitoring were conducted during February-March, 2012 so as to verify the compliance of Directions issued under section 5 of the E (P) Act, 1986.

- Common Bio-medical Waste Treatment Facilities were also monitored regularly both in HCFs and CBWTFs by surprise inspections. Accordingly, surprise inspection of the CBWTFs namely 1) M/s Central Pollution Control Committee, Varanasi, Uttar Pradesh, 2) M/s. Ferro Build Hards India (P) Ltd., Naini, Allahabad, UP, 3) M/s E-Tech Projects Ltd., Bhilai, Distt. Durg, Chhattisgarh, 4) M/s. Shushrutha Bio-Medical Waste Management Society, Shimoga, Karnataka and 5) M/s. Superb Hygienic Disposal, Pvt. Ltd., Chandrapur, Dist- Chandrapur, Maharashtra have been carried out during November-December, 2012 and based on the violations observed, directions under section 5 of the Environment (Protection) Act, 1986 have been issued by Central Pollution Control Board to these facilities for ensuring compliance in a time bound manner.
- Two Armed Forces Health Care Facilities viz. 'Base Hospital, Delhi Cantt' & 'Army Hospital (R&R), Delhi Cantt' were inspected on 9th November, 2011 by Central Pollution Control Board to assess the current status of compliance to the provisions of BMW Rules & CPCB guidelines. The recommendations have been communicated to the Director General, Armed Force Medical Services, Ministry of Defence, New Delhi for taking necessary action.

14.5.5 Directions under Section 5 of the Environment (Protection) Act, 1986 to Common Bio Medical Waste Treatment Facilities (CBWTFs) and Verification of compliance of Directions issued under Section 5 of the Environment (Protection) Act, 1986:

Central Pollution Control Board is regularly monitoring Common Biomedical Waste Treatment Facility /HCFs to improve compliance of CPCB's Direction under Section 5 of the Environment (Protection) Act, 1986 issued to defaulter HCFs/CBWTFs. Based on the inspections and monitoring conducted during the year 2011-2012, Central Pollution Control Board issued Directions under Section 5 of the Environment (Protection) Act, 1986 to the 11 nos. of defaulter CBWTFs located in the State of Chhattisgarh, Gujarat, Karnataka, Maharashtra, Rajasthan, Tamilnadu & Uttar Pradesh and in the UT namely Chandigarh for not complying with the provisions of BMW Rules and CPCB guidelines. The concerned HCFs/CBWTFs have been directed to submit time bound action plan along with a bank guarantee in favour of CPCB, to ensure compliance to the CPCB Directions. Directions issued under Section 5 of the Environment (Protection) Act, 1986 to a CBWTF located at Kurnool in the state of Andhra Pradesh have been revoked, upon compliance to the directions.

14.5.6 Evaluation of new proposed State of Art treatment technologies for safe disposal of bio-medical waste

- CPCB has constituted an Expert Committee on bio-medical waste management with the members from organizations such as MoEF, NPC, DHS, AIIMS & Toxic Link (an NGO). Under the Chairmanship of Dr. T. K. Joshi, Director, Deptt. of Occupational Environment & Health, Maulana Azad Medical College, New Delhi for the purpose of evaluation of state-of the art technologies for treatment of bio-medical waste and to suggest suitable standards for any such technologies.
- CPCB conducted 12th meeting of the Expert Committee on 'Bio-medical Waste Management' on 7th July 2011 at Central Pollution Control Board, Delhi and considered the new technology 'PIWS 3000 (Static/Mobile)' based on shredding & chemical disinfection. Based on the clarifications provided to the queries raised by the members of the Expert Committee, a provisional approval to adopt the technology for treatment of bio-medical waste treatment has been accorded subject to the conditions. The final approval for the same is under consideration.
- Based on the findings of the trial run of the 'Sharp Blaster' proposed by M/s Safe Environmental Solutions International Limited, UK, the provisional approval for adoption of "Sharp Blaster (Needle Blaster)" System for treatment of bio-medical waste category no. 04 (i.e sharp waste sharps) as per Schedule I of the Bio-medical Waste (Management & Handling) Rules has been extended for another two years subject to the conditions.
- The 'Plasma Pyrolysis Technology' proposed by the Facilitation Centre for Institute of Plasma Technology (FCIPT), Gujarat have been granted provisional approval for treatment of bio-medical waste categories (1), (2), (5) & (6) stipulated under BMW Rules as per recommendations of the members of Expert Committee on Bio-medical Waste Management.
- Plasma Anaerobic Bio- Reactor Technology as an option for treatment of bio-medical waste (placenta) in pursuant to Judgment of Hon'ble High Court of Kerala dated 19th December, 2011 in the matter of Writ Petition (C) No. 35951/2007 (Krishna Nursing Home, Chittoor Road, Ernakulum Vs Union of India & Others) has been received and discussed in meeting on 16th Feb, 2012 and it was decided to consider the matter in the next Expert Committee Meeting.

14.5.7 Organization/sponsoring of programmes on Bio-medical Waste Management

Central Pollution Control Board initiated a programme called 'Paryavaran Darshan' in collaboration with 'Doordarshan' to create awareness and to

disseminate the information on various issues pertaining to environmental management including the steps to be taken for ensuring compliance to the provisions of the Bio-medical Waste (Management and Handling Rules, 1998 and amendments thereof. The 'documentary film' prepared covering the aspect of segregation, packaging, transportation, storage, treatment and disposal etc. and the said documentary have been telecasted onDoordarshan Channel under 'Paryavaran Darshan' programme on March 26, 2011 & August 13, 2011.

14.5.8 Interaction Meet with Common Bio Medical Waste Treatment Facilities CBWTFs:

Central Pollution Control Board, organized interaction meet on 2nd March, 2012 with Common Bio-medical Waste Treatment Facility Operators of Northern & Central Zone and the officials from State Pollution Control Boards(SPCBs / Pollution Control Committee PCCs) for ensuring effective implementation of Bio-medical Waste (Management & Handling) Rules, 1998 as well as CPCB's guidelines for CBWTFs. The recommendations of the interaction meet have been communicated to all the concerned and have been requested to ensure compliance to the decisions taken in the said interaction meet, in a time bound manner.

14.5.9 Guidelines for Environmentally Sound Management of Mercury Waste Generated in Health Care Facilities:

Considering the possible spillages of mercury in view of the use of mercury containing devices by Health care facilities the Central Pollution Control Board prepared and circulate guidelines for proper management of mercury bearing waste generated from HCFs. The document on "Environmentally Sound Management of Mercury Waste Generated in Health Care Facilities" has been preapred envisaging the aspects such as sources of mercury bearing waste generation in Health Care Facilities, strategies for managing mercury bearing waste generated in health care facilities, mercury source reduction, alternatives to mercury based medical instruments in HCFs, guidelines for storage of mercury based medical instruments for prevention of mercury spill, precautions to be taken during the accidental spillages or breakages of mercury based instruments in HCFs, clean up/collection of spill/mercury spill management, procedures & mercury waste disposal options including maintenance of mercury audit, need & aspects of training and awareness activities etc.

A flow chart showing mercury spill collection procedures & the mercury disposal options as described in the Guidelines is presented below:

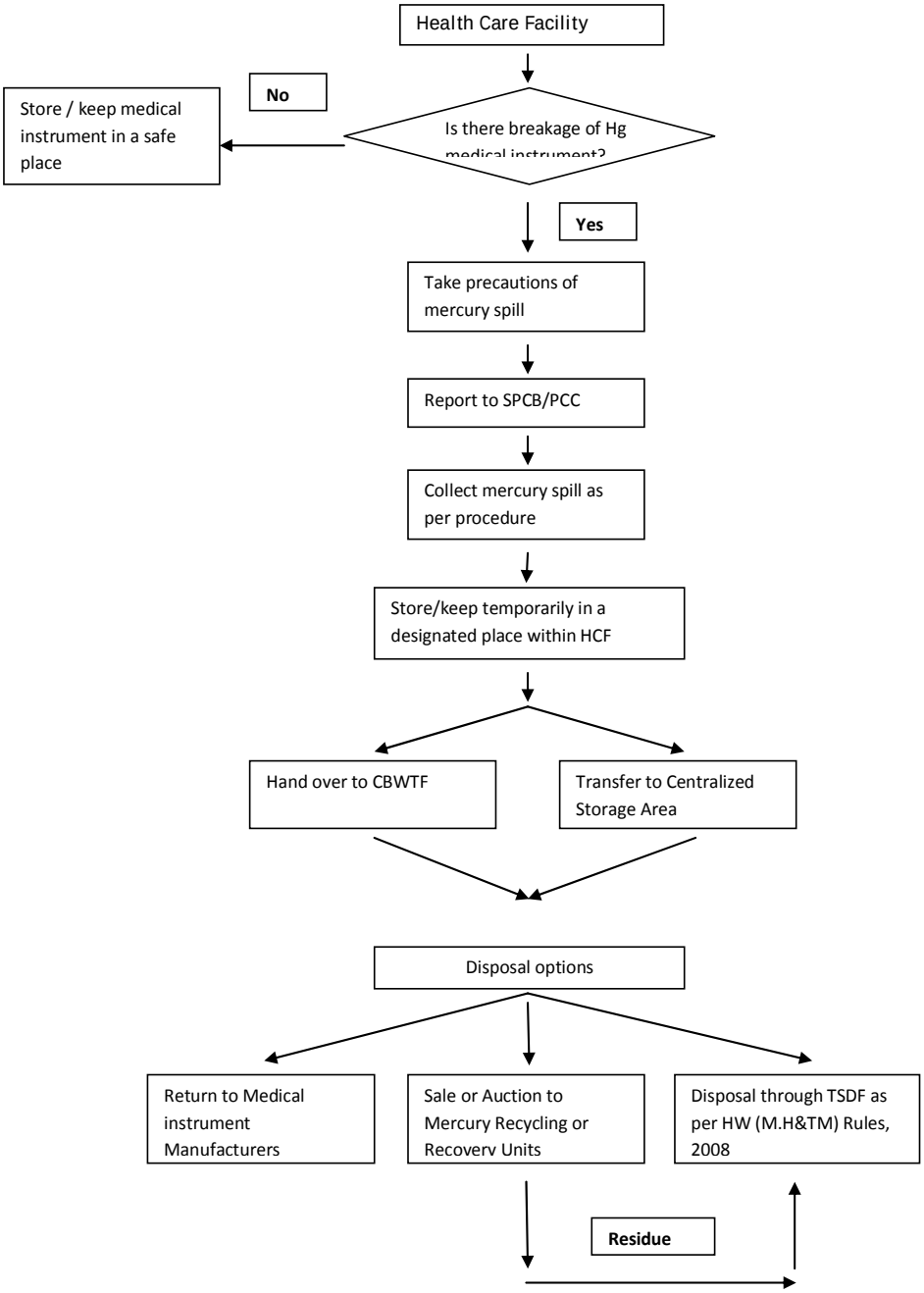


Figure 14.2 : Mercury Spill Collection Procedure

14.5.10 Follow-up with SPCBs/PCCs on 'Parliamentary Standing Committee on 'Management of Hospital & Pharmaceutical Wastes' and compilation of information

Information along with updated details in respect of bio-medical waste generation as well as details of bio-medical waste Category No. 5 i.e. 'Discarded Medicines

and Cytotoxic Drugs', generation quantity (in kg), its storage, treatment & disposal practices being followed in the States / UT were sought by Central Pollution Control Board in the matter of Department –related Parliamentary Standing Committee on Science & Technology and Environment & Forests regarding "Environment issues pertaining to Management of Hospital and Pharmaceutical Wastes". The information received have been compiled & submitted to Ministry of Environment & Forests for necessary action.

14.6 PLASTIC WASTE MANAGEMENT:

Disposal of plastic waste is burgeoning environmental issue in the country. New technologies being developed to minimize their adverse effect on the environment. Currently Worldwide accepted technology used for the plastic disposal is incineration; however, the incinerators designed poorly, releases extremely toxic compounds (chlorinated dioxins and furans), raising several environmental issues. The technologies for safer disposal of plastic waste are being experimented on behest of Central Pollution Control Board.

14.6.1 Utilisation of plastic waste in road construction;

Polymer Blended Bitumen Roads laying using waste plastics is designed and the technique is being implemented successfully for the construction of flexible roads at various places in the country. The schematic flow diagram is presented in Figure 14.2.

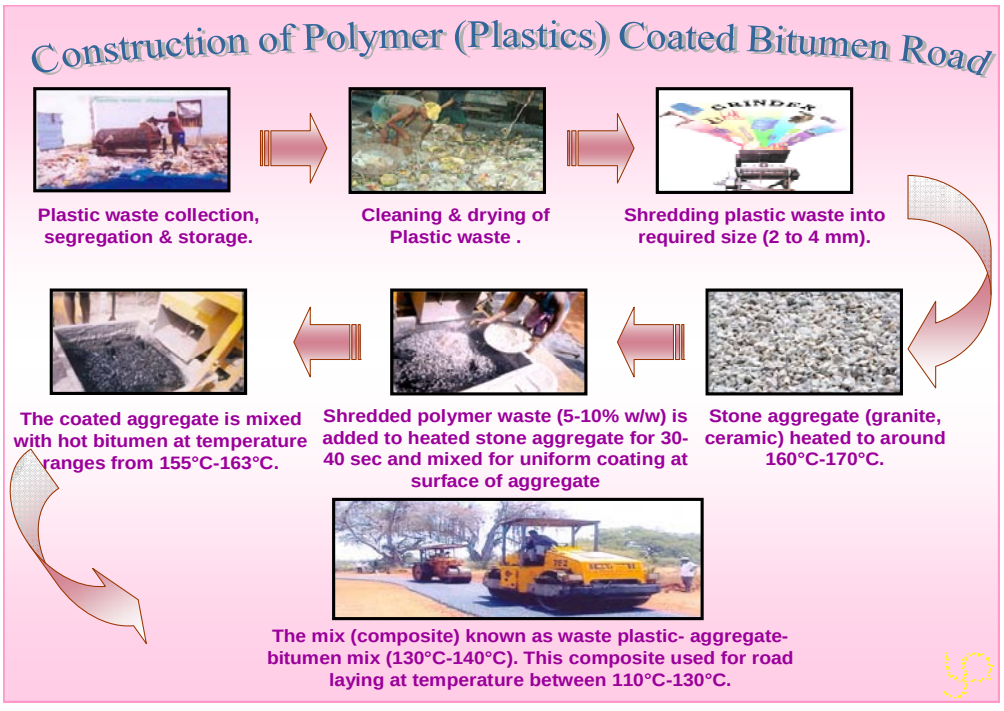


Figure 14.3 : Schematic flow diagram of plastic coated bitumen road construction

14.6.2 Co-processing of Plastic waste in Cement Kiln (Link)

To get rid of plastic waste disposal problems, Central Pollution Control Board (CPCB) in association with MP Pollution Control Board has taken initiative to use plastic waste in cement plant at ACC Kymore (Katni, MP). The stack monitoring result revealed that emission values are found below the standard set for Common Hazardous Waste Incinerators. After getting encouraging results the Central Pollution Control Board has granted permission to many cement plants to co-process the hazardous and non-hazardous (including plastic) waste in their kilns after trial runs.

14.6.3 Co-processing of plastic waste as Alternative Fuel and Raw Material (AFR):

Co-processing refers to the use of waste materials in industry process such as cement, lime or steel production and power stations or any other large combustion plants. Co-processing indicate substitution of primary fuel and raw material by waste, recovering industry and material from waste. Waste material such as plastic waste used for co-processing are referred to as alternative fuels and raw material (AFR). Co-processing of plastic waste offers advantages for cement industry as well as for the Municipal Authorities responsible for waste management. The Cement producers can save fossil fuel and reduce raw material consumption, contributing to more eco-efficient production. In addition, one of the advantage of recovery method used in existing facility, eliminates the need to invest on other plastic waste practices and to secure land filling.

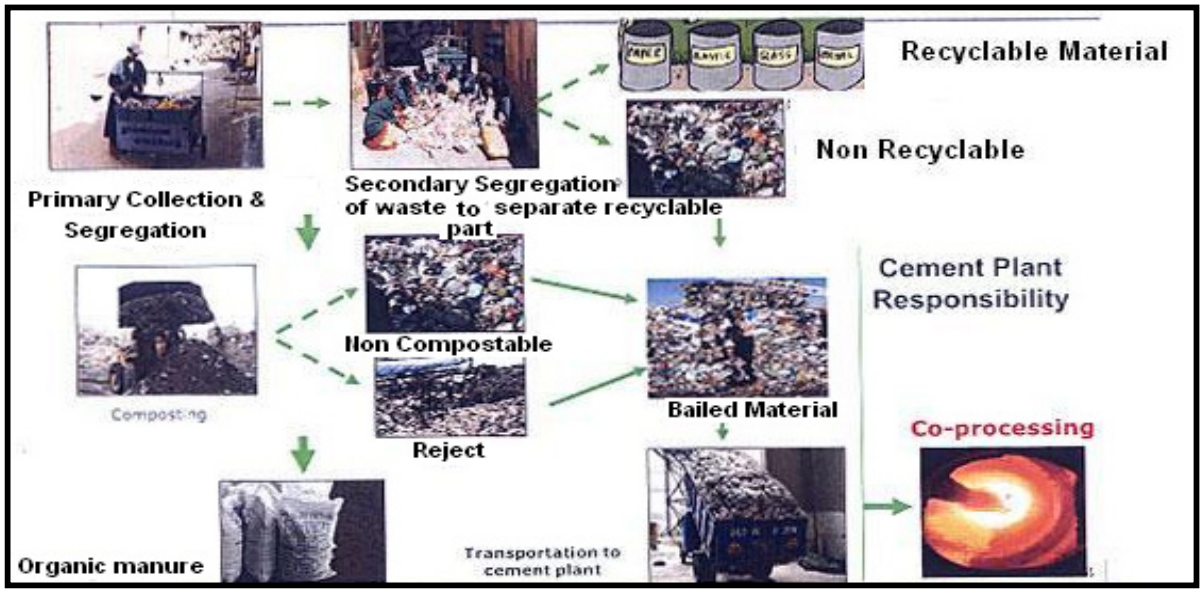


Figure 14.4 : Co-processing of plastic waste

Table 14.11: Status of Plastic Waste Management –At a Glance (Updated on 30.05.2012)

S. No.	Item	Description	
1.	Total Population year 2008 (As per World Bank).	1139964932 (Say 114 Million)	
2.	Estimated Plastic Production in year 2008.	8 Million tonnes	
3.	Plastic Waste Generation (Considering: 70% as waste)*	5.6 Million tonnes/Year	15342.46 tonnes/day
4.	Plastic waste Generation per capita.	4.91 kg/Year	13.45 gm/day
5.	Plastic Waste Collection (Estimated: 60% by weight)	3.36 Million tonnes /Year	9205 tonnes/day
6.	Uncollected Plastic Waste (Estimated: 40% by weight)	2.24 Million tonnes /Year	6137 tonnes/day
7.	a) CPCB study on MSW generation in 60 major cities (2010-11)	1.8466080 Million tonnes /Year	50592 tonnes /day
	b) CPCB study on Plastic waste generation in 60 major cities (2010)	0.1277847 Million tonnes /Year	3501 tonnes /day
8.	No. of Plastic Manufacturer and Recycling Unit in Industrial area	5511 (30 States and UTs)	
9.	No. of Registration Granted	2108	
10.	States and UTs Issued Separate Act/Notification	15 [Goa, Haryana , Himachal Pradesh, Karnataka, Kerala Maharashtra, Madhya Pradesh, Nagaland, Punjab, Meghalaya, Chandigarh, Lakshadweep Puducherry, Delhi, Rajasthan]	
11.	States and UTs Banned Plastics Carry bags	Details given as below	
12.	(i) Complete Ban on	11 [Chandigarh, Sikkim, Nagaland, Delhi,	

S. No.	Item	Description
	Plastic Bags (Through Notification/Act)	Haryana, Himachal Pradesh, Tripura, Rajasthan, J&K, Andaman & Nicobar Island & Lakshadweep]
	(ii) Partial Ban (Through Executive Order)	10 [Andhra Pradesh, Arunachal Pradesh, Assam, Goa, , Karnataka, Orissa, Tamil Nadu, West Bengal, Mizoram, Uttar Pradesh]
13.	Names of States and UTs Increased the thickness of plastic carry bags i.e. >40 micron	03 [Maharashtra:50 µ, Tamil Nadu:60 µ and Puducherry: 51 µ]
14.	Use of carry bags made from compostable plastic or material	As per Plastic Waste (Management & Handling) (Amendment) Rules, 2011, carry bags can be made from compostable plastic or material confirming to IS/ISO:17088:2008
15.	Plastic Waste Utilization	(i) Plastic Waste can be utilized in road construction such as in the States of Tamil Nadu, Karnataka, Maharashtra, Puducherry and Himachal Pradesh etc. (ii) Plastic Waste can be co-processed in Cement kilns such as in the States of Madhya Pradesh, Tamil Nadu, Orissa, Andhra Pradesh etc.
Abbreviation : MT= Million tonnes, kg= Kilogram, gm = Gram, * CPCB report on "Report of the Committee to Evolve Road Map on Management of Wastes in India".		

14.6.4 Way Forward for Plastic Waste Management

- Setting-up of systematic mechanism for plastic waste collection, segregation and disposal;
- Recycling of plastic waste in an environmental friendly manner
- Closure of industries in non-conforming areas
- Utilization of plastic waste in road construction (Polymer-coating over stone aggregate);
- Co-processing of plastic waste in cement kiln;.
- Widespread mass awareness programme on use of plastic packaging, and its impact on environment, on littering;
- Extended Producer Responsibility (EPR) or Corporate Social Responsibility (CSR) in management of plastic waste;
- Use of bags made from alternate materials i.e. biodegradable and compostable films, jute cloth, paper etc.

14.7 HAZARDOUS WASTE MANAGEMENT

14.7.1 Constitution of Technical Expert Committee for utilization of hazardous wastes as supplementary resource

Rule 11 of the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, stipulates that "the utilization of hazardous wastes as supplementary resource or for energy recovery or after processing shall be carried out by the units only after obtaining approval from the Central Pollution Control Board". Accordingly, Central Pollution Control Board has constituted Technical Expert Committee to encourage utilization of hazardous waste as a supplementary resource or for energy recovery or after processing and formed a framework/ procedure for granting permission for the cases other than co-processing in cement kilns as below:

a) The applicant desirous to utilize the hazardous wastes after processing or as a supplementary resource or for energy recovery, shall submit the proposal to CPCB along with the following enclosures :

   - Information on the proposed Hazardous Waste utilization as per the format along with all supporting technical details, process flow sheet, waste characteristics etc. as required.
   - Copy of valid Consent to Establish/Operate under the Air Act & Water Act from the concerned SPCB/PCC.

b) Incomplete applications will be communicated to the applicant and in case of no response within 30 days, the application shall be returned with the approval of technical expert committee.
c) Complete applications shall be placed before technical expert committee constituted by CPCB to evaluate environmentally soundness of the proposal. The proponents shall make technical presentation before the committee. For all new waste categories trial run will be conducted.
d) After approval of the recommendations of the technical expert committee by Chairman, Central Pollution Control Board, the individual cases shall be processed accordingly.
e) CPCB shall issue letter to the unit permitting procurement of desired quantity of hazardous wastes as raw material after obtaining permission from the concerned SPCB/PCC.
f) After receipt of permission and procurement of the hazardous wastes, the unit shall inform about their preparedness of carrying out trial run. Trial run shall be carried out by the unit in presence of the CPCB/SPCB officials and monitoring conducted by an EPA recognized NABL accredited laboratory.

g) The concerned Zonal Office shall submit the report on the trial run within 30 days.
h) After receipt of the report on trial run from the Zonal Office, the matter shall be placed before the technical expert committee. The recommendations of the committee shall be approved by the Chairman, Central Pollution Control Board. Based on the approval Division shall process the individual case for further action under Rule 11 of the Hazardous Waste (Management & Handling Rules), 2008.
i) The units which do not respond to CPCB's request for clarifications/ documents/trial run may be asked finally to respond within 30 days and in case no response is received within 30 days, the case shall be deemed to be withdrawn by the applicant and the same shall be communicated to the unit and the concerned SPCB.
j) The technical expert committee shall meet when atleast 05 cases have been accumulated or at every two months, whichever is earlier.
k) Rule 11 of the HWM Rules, 2008, does not stipulate validity of the approval to be accorded by the Central Board but the same may be permitted initially for one year with random checks/sampling by CPCB/SPCB twice a year. Based upon the satisfactory results regular permission with 5 years validity limit shall be permitted, proposed as in case of re-processing of Hazardous Waste listed in Schedule- IV as per specified in Rule-8 (Sub rule- 4) of Hazardous Waste (Management & Handling Rules) 2008.
l) The application for renewal of approval granted for one year shall be submitted to CPCB at least two months in advance of the expiry. The application shall be submitted along with self-declared compliance report with reference to conditions stipulated by the Central Board in the approval letter. The application shall be forwarded to the respective Zonal Office of the Central Pollution Control Board for verification of the same. The inspection report as received from the Zonal Office along with the recommendations shall be placed before the aforesaid expert committee for making appropriate recommendations.

14.7.2 Trial Run Utilization of hazardous waste and Permission granted thereof

Trial run for few categories of wastes like spent acid, spent catalyst, Sludge from gas cleaning plant, Anode mud, distillation residue, spent resin, Hydro Fluoro Silicic acid, spent solvent etc. have been conducted to assess environmentally sound utilization of the same and based on the same, permissions have been granted under Rule 11 for utilization of hazardous waste like Ethylene glycol residue, Carbon slurry, High Boiler residue, ETP Sludge, Resin waste, spent chromic acid, spent acid containing molybdenum compound and waste pickling

acid. Eight units have been granted approval for utilization of such hazardous waste.

14.7.3 Status of Common Integrated Treatment, Storage & Disposal Facilities (TSDFs), Exclusive Common Incinerators & Secured Landfills

State-wise Availability of Common Integrated Treatment, Storage & Disposal Facilities (TSDFs), Exclusive Common Incinerators & Secured Landfills is presented in Table 14.12.

Table 14.12: State wise status of Common Integrated TSDFs, Common incinerators and secured landfills

S. No.	State/UT	Integrated TSDFs	Exclusive Common Incinerators	Exclusive Common Secured Landfills
1.	Andaman & Nicobar Islands	-	-	-
2.	Andhra Pradesh	2	-	-
3.	Arunachal Pradesh	-	-	-
4.	Assam	-	-	-
5.	Bihar	-	-	-
6.	Chandigarh	-	-	-
7.	Chhattisgarh	-	-	-
8.	Daman, Diu, Dadra & Nagar Haveli	-	-	1
9.	Delhi	-	-	-
10.	Goa	-	-	-
11.	Gujarat	3+ 1#	1	4
12.	Haryana	1 *	-	-
13.	Himachal Pradesh	-	-	1
14.	Jammu & Kashmir	-	-	-
15.	Jharkhand	-	-	-
16.	Karnataka	-	3	1
17.	Kerala	-	-	1
18.	Lakshdweep	-	-	-
19.	Madhya Pradesh	1 *	-	-
20.	Maharashtra	2+1#	-	1
21.	Manipur	-	-	-
22.	Meghalaya	-	-	-
23.	Mizoram	-	-	-

S. No.	State/UT	Integrated TSDFs	Exclusive Common Incinerators	Exclusive Common Secured Landfills
24.	Nagaland	-	-	-
25.	Odisha	-	-	1
26.	Puducherry	-	-	-
27.	Punjab	-	-	1
28.	Rajasthan	-	1	2
29.	Sikkim	-	-	-
30.	Tamilnadu	1	-	-
31.	Tripura	-	-	-
32.	Uttar Pradesh	1+ 1*	1	1
33.	Uttarakhand	1	-	-
34.	West Bengal	1	-	-
	TOTAL	**16**	**6**	**14**

** Incinerator installed and the same is under commissioning.*

 # Operation of incinerator is under suspension.

14.7.4 NCEF Project on Remediation of Hazardous Waste Contaminated Dump Sites

Ministry of Environment & Forests (MoEF) has initiated the project with Central Pollution Control Board as Project Implementing Agency for 'Remediation of Hazardous Waste Contaminated Dumpsites' in the country under National Clean Energy Fund (NCEF). The project envisages outlining the contaminated areas, identification & assessment of contaminants, detailed site investigation and characterization, risk assessment studies, selection of remediation criteria, outlining remediation options, preparation of detailed technical specifications for selected remediation options, preparation of bid document and monitoring of remediation activity for 12 contaminated areas.

The Inter-Ministerial Group (IMG) of the Ministry of Finance in its meeting on 11th August, 2011 has approved the MoEF proposal for remediation of 12 hazardous waste contaminated areas (containing multiple sites) at an initial project outlay of ` 805 crores. The funding under NCEF is limited to 40% of the total project cost. The remaining 60% to be borne by the State Governments through polluter pays/PPP/States share etc.

CPCB constituted two committees i.e. Project Steering Committee (PSC) and Technical Expert Committee (TEC) to oversee the activities of the NCEF project. The PSC is headed by Chairperson, CPCB and includes Member Secretary, MoEF representative and Chairman of the respective SPCBs (Kerala, Madhya Pradesh,

Orissa, Tamil Nadu, Uttar Pradesh, West Bengal, Gujarat, Rajasthan) as its members. The TEC is headed by Chairperson, CPCB and has members from GIZ, IIT-Delhi, NGRI, NEERI etc.

CPCB conducted two PSC meetings on 09-11-2011 and 30-11-2011 respectively where members/representatives from SPCBs participated and deliberated the project in terms of approving the number of sites, preparation of ToR (Terms of Reference), and the EoI publication. The 6 SPCBs have agreed in-principle for 60% funding from their states covering 10 contaminated areas out of 12 initially proposed. This includes 18 sites spread across 10 contaminated areas within 6 States. SPCBs of Gujarat and Rajasthan have opted out of the NCEF funded project. The list of sites taken for study under the NCEF project.

Table 14.13: List of hazardous waste contaminated areas – NCEF Project

S.No	State	Area	No. of Sites	Nature of Contaminant
1.	Kerala	Eloor-Edayar, Cochin	1	**Heavy metals and POPs**
2.	Madhya Pradesh	Ratlam	4	**Gypsum, iron salts and Naphthalene**
3.	Odisha	Ganjam	3	**Mercury**
4.	Odisha	Talcher	1	**Chromium**
5.	Odisha	Sundergarh	4	**Chromium**
6.	Tamil Nadu	Ranipet	1	**Chromium**
7.	Uttar Pradesh	Rakhimandi, Kanpur	1	**Chromium**
8.	Uttar Pradesh	Rania, Kanpur Dehat	1	**Chromium**
9.	Uttar Pradesh	Lucknow	1	**HCH (hexa chloro cyclo hexane)**
10.	West Bengal	Nibra Village, Howrah	1	**Chromium**

14.7.5 Technical Evaluation of Waste-to-Energy Plant, Okhla, Delhi

Delhi Government in the year 2005 initiated the waste to energy (WtE) project for disposal of MSW with Infrastructure Leasing and Financial Services Ltd (ILFS) as project consultant to develop a Public Private Partnership model. A Special Purpose Vehicle (SPV) "Timarpur Okhla Waste Management Co. Pvt. Ltd." was formed to develop an integrated MSW processing complex at two locations i.e. at Timarpur and Okhla. M/s JITF urban infrastructure limited (formerly known as Jindal Urban Infrastructure Limited and branded as Ecopolis) took over 'Timarpur-Okhla waste Management Company Private Limited' on BOOT (Build, Operate, Own, and Transfer) basis. Accordingly, facility at Okhla site has been setup to process 1300 Tonnes per day (TPD) of MSW to produce 450 MTD Refuse

Derived Fuel (RDF), additional 100 tons of MSW of green waste (from hotel & Subji Mandi) for generation of biogas from anaerobic digester and thus producing 16MW electricity from the RDF and biogas.

There has been resistance from the public especially the residents of Sukhdev Vihar living adjacent to the Okhla Sewage Treatment Plant raising concerns over environmental impacts due to handling of large quantities of MSW and operation of Waste to Energy Plant. It was then decided by then Hon'ble Minster of Environment that CPCB shall look into the technical aspects of the proposed project.

Central Pollution Control Board (CPCB) constituted an Expert Committee Chaired by Chairman, CPCB to examine the technical details of the project. The Expert Committee comprised of members from GIZ, IIT-Delhi, Delhi Pollution Control Committee (DPCC), Dept. of Environment, Delhi Govt., NGO and Public representatives. The representatives from New Delhi Municipal Corporation (NDMC), Municipal Corporation of Delhi (MCD), Ministry of New & Renewable Energy, Govt. of India and Delhi Jal Board were also invited to the Expert Committee Meeting. The scope of project evaluation was limited to technical aspects of the project.

A consolidated report on "Technical Evaluation of MSW based Waste to Energy Plant at Okhla STP Site, Delhi", has been prepared by Central Pollution Control Board based on the discussions and feedback received from the expert members. This report, which also lays down recommendations, has been forwarded to all the stakeholders including project proponent, DPCC, Dept. of Environment. Govt. of Delhi, MoEF, MCD, NDMC etc.

14.7.6 Existing Scenario of Hazardous Waste Management in India

Hazardous Waste Management Rules are notified to ensure safe handling, generation, processing, treatment, package, storage, transportation, use, reprocessing, collection, conversion, and offering for sale, destruction and disposal of Hazardous Waste. These Rules came into effect in the year 1989 and have been amended later in the years 2000, 2003 with final notification of the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, in supersession of earlier notifications. The Rules lay down corresponding duties of various authorities such as MoEF, CPCB, State/UT Govts., SPCBs/PCCs, DGFT, Port Authority and Custom Authority, while State Pollution Control Boards/Pollution Control Committees have been designated with wider responsibilities touching across almost every aspect of hazardous wastes generation, handling and their disposal.

Based on the information obtained from SPCBs/PCCs, it is estimated that there are about 41523 number of hazardous waste generating industries in India and their hazardous waste generation is about 7.90 million tonnes per annum. These wastes can be categorized into three components such as recyclable, land fillable and incinerable and their percentage constitutions are as below:

Total generation - 7.90 million tonnes /Annum
Landfillable - 3.32 million tonnes /Annum
Recyclable - 3.98 million tonnes /Annum
Incinerable - 0.60 million tonnes /Annum

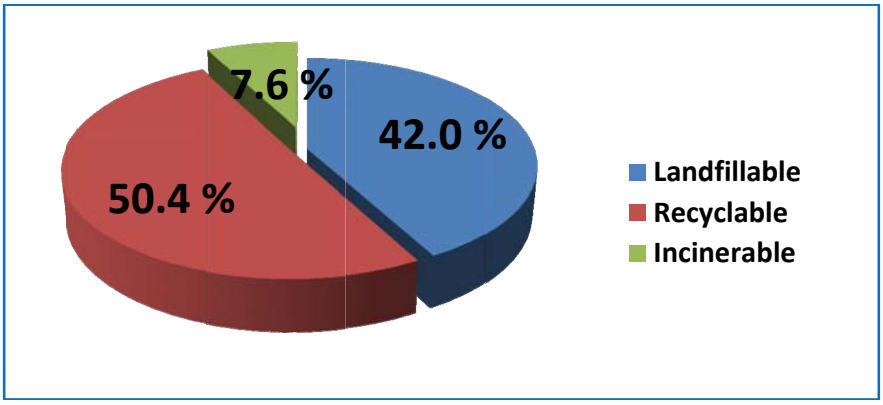


Figure 14.4 : Percentage component of Hazardous Waste Generation

Maharashtra (22.84%), Gujarat (22.68 %) and Andhra Pradesh (13.75 %) are the top three Hazardous Waste generating States in the country. Rajasthan, Tamil Nadu, Madhya Pradesh and Chhattisgarh States are in second line with generation of more than 2.5 lakh tonnes per annum Hazardous Waste. These seven States together, are generating about 82% of country's total hazardous waste. The State/Union Territories wise generation of hazardous waste is given in Table 14.14.

The generators have the option of recycling/reprocessing/co-processing/utilization of hazardous prior to ultimate option of disposal at secure land fill facility (SLF) or destruction in incinerator. Such disposal can be carried out either at captive or common disposal facilities. There are 36 common hazardous waste treatment, storage and disposal facilities (TSDFs) (having incinerators and / or SLFs) in 16 States/UTs. The wastes generated in remaining States have limited or inadequate options for disposal due to hindrances in interstate movement and permissions.

The existing TSDFs have a cumulative capacity of about 32 million Metric tons for secure landfilling and about 0.18 million tonnes/annum for incineration. There is need for setting up of common disposal facility in the States generating moderately

high quantity of hazardous waste but not having TSDFs; such States are Chhattisgarh, Jharkhand, J&K, Goa, Assam, and Puducherry. However, there is adequate capacity for recycling/reprocessing of the hazardous waste such as used oils , waste oils, Zinc dross/ Zinc residue, lead bearing waste, spent catalyst etc. listed in Schedule-IV of HWM Rules.

Table 14.14: State-wise status of Hazardous Waste generation in India

S.No.	Name Of State/UTs			Quantity of Hazardous waste generation (MTA)			
	Name Of State/UTs	Year	No. of units generating HW	Landfill able	Incinerable	Recyclable	Total
1	Andhra Pradesh	01.04.2010	3222	414747	42826	629167	1086740
2	Assam	2011	47	3835	269	14386	18490
3	Bihar	2010	53	3612	8	725	4345
4	Chhattisgarh	2010	189	83055	7436	196069	286560
5	Delhi	2008	1995	3338	1740	203	5281
6	Gujarat	2011	7751	1107130	108622	577037	1792789
7	Goa	2009	509	12955	30579	12964	56498
8	Haryana	2010	1646	14862	6745	7952	29559
9	H.P.	31.10.2011	1909	9202	652	20143	29997
10	J.& K.	2008	291	9946	141	6867	16954
11	Jharkhand	2008	435	23135	9813	204236	237184
12	Karnataka	March-Oct, 2011	3103	47266	38239	96334	181839
13	Kerala	2009-10	442	46295	184	16750	63229
14	Madhya Pradesh	2010	1024	36397	4709	324371	365477
15	Maharashtra	31.03.2011	5428	514866	236156	1054363	1805385
16	Manipur	2008	264	0	115	137	252
17	Meghalaya	2011	34	13	241	3935	4189
18	Mizorum	2010	213	31	186	Nil	217
19	Nagaland	2010	2	0	0	10	10
20	Orissa	2010-11	431	81076	13201	28041	122318
21	Punjab	30.09.2011	3323	18432	17515	54280	90227
22	Rajasthan	30.06.2011	535	545396	38465	179179	763040
23	Tripura	2010	0	4	21	255	280
24	Tamil Nadu	31.03.2011	2869	240939	17976	138347	397262
25	Uttar Pradesh	31.10.2011	2159	34975	15986	161025	211986
26	Uttarkhand	2011	471	3957	3942	10110	18009
27	West Bengal	2011	914	44389	5629	146516	196534
U.T.							0
1	Daman, Diu, Dadra & NH	2008	1937	17219	421	56350	73990
2	Pondicherry	2011	90	133	25	35093	35251
3	Chandigarh	2009	237	3942	0	5794	9736
	Total		**41523**	**3321147**	**601842**	**3980639**	**7903628**

14.8 IMPLEMENTATION OF BATTERIES (MANAGEMENT & HANDLING) RULES, 2001 AS AMENDED ON MAY 2010.

The Batteries Management and Handling Rules were enacted in the year 2001 with the primary objective of channelizing the used lead acid batteries for environmentally sound recycling. Rules have been stipulated for proper control and record keeping on manufacture, sale, import, generation, collection and recycling of used batteries by involving various stake holders.

In the Batteries Rules, Responsibilities have been fixed for manufacturers, importers, re-conditioners and assemblers to ensure that used batteries are collected back and routed to registered recyclers. Responsibilities were also fixed on other stake holders such as dealers, recyclers, consumers, auctioneers, regulators including the customs authorities.

14.8.1 Status of Annual Compliance Report (ACR) Submitted by SPCBs/PCCs

As per The Batteries (Management & Handling) Rules, CPCB shall compile and publish the data received every year from State SPCBs/PCCSs to review the compliance of the Batteries Rules in the country. CPCB has received ACR information from only 14 States, while, remaining States have not responded despite reminders.

14.8.2 Status of the Registered Importers of New Lead Acid Batteries

The scheme for registration of importers of new lead acid batteries has been transferred from MoEF to Central Pollution Control Board as per the amendment notification SO 1002 (E) dated 4.5.2010 under The Batteries (Management & Handling) Rules, 2001. CPCB has been issuing registration to importers of new lead acid batteries by adopting uniform criteria provided on CPCB website. The registration is an enlisting process at CPCB so as to ensure that importers of new lead acid batteries channelize the used batteries to registered recyclers. The customs department verifies the registration certificates issued by CPCB/MoEF at the time clearing the consignment of new lead acid batteries. The importers of new lead acid batteries are given registration for 5 years with the following condition:

i. The company shall fulfil all the responsibilities detailed under Rule 4 of the Battery (M&H) Amendment Rules, 2010.
ii. The company shall file an undertaking as per Form-III to the Member Secretary of the concerned State Pollution Control Board and the concerned Customs Authority.
iii. The company shall file half-yearly return of the sale/collection of lead acid batteries in Form I to the concerned State Pollution Control Boards with a copy to the Central Pollution Control Board/ Customs Authority.

The status of registration/enlistment of importers as on March 2012 is given below;

Table 14.15: Registration of importers of New Lead Acid Batteries

Registration Granted by	Year 2010-11	Year 2011- 12
MoEF	1009 (till May 2010)	NA
CPCB	234 (from May 2010)	235

About 1478 importers have been registered till March, 2012 by Ministry of Environment & Forests & CPCB for import of new lead acid batteries. The status of application of importer of new lead acid batteries and registration granted to importers are being regularly updated on CPCB's website. The Status of submission of Half-yearly returns in Form-I by the registered importers of new lead acid batteries is given below:

Table 14.16: Status of Half yearly Returns submitted by Registered Importers of New Lead Acid Batteries

Number of Importers submitted the half-yearly returns for the year 2010-11	Number of Importers submitted the half-yearly returns for the year 2011-12
100	500

14.8.3 Project on "Web based Battery Registration and Management System (BRMS)"

In order to bring transparency in public domain and also to increase the efficiency in the process of grant of registration Central Pollution Control Board has initiated a project for development of web based Battery Registration Management System (BRMS) wherein the applicants desirous of seeking registration can apply online, view the status of their application, submit the undertaking prior to import and also submit half yearly returns on the same platform. This application would help SPCBs and customs authorities in tracking the status of compliance of each registered importer.

14.9 UPDATION AND MAINTENANCE OF CPCB WEBSITE

CPCB's website is updated regularly and the users' response/access to this website has been very good. During the year 2011-2012, number of hits was more than 360 million, out of which 91% hits were successful. On an average, more than 2,800 visits were made to the site by users and average duration of visit was more than 6 minutes. One third of the visits were made by the international users.

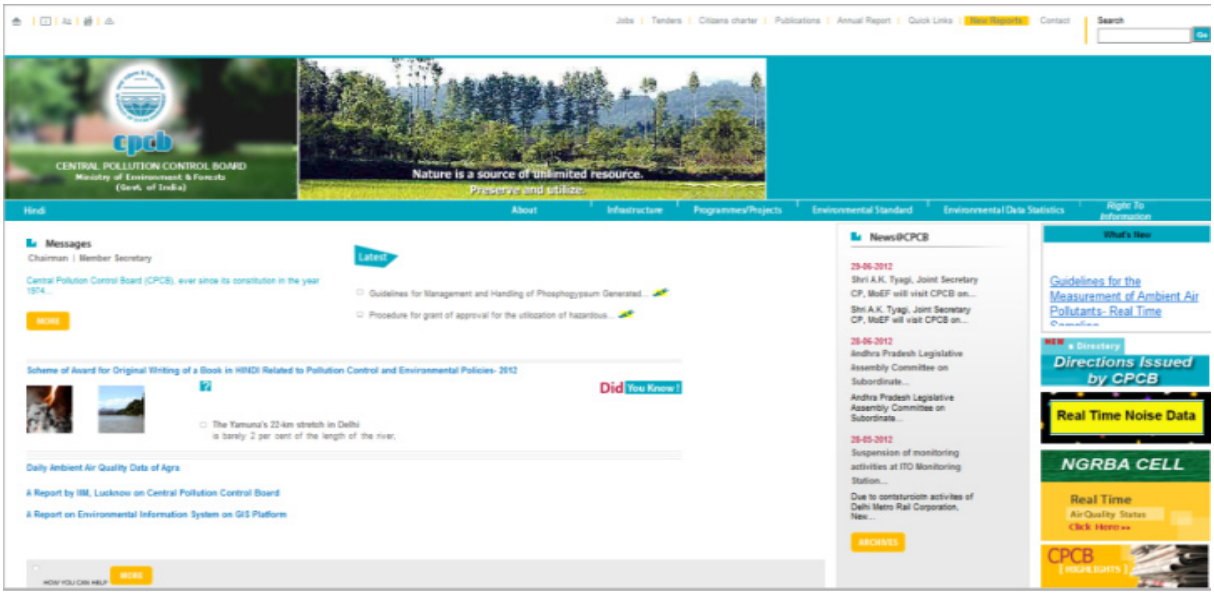


Figure 14.5 : Website page of CPCB website

Following works performed during the Year 2011-12:

- Developed separate New web pages for uploading the Directions issued under section 18 (1) (b) and under section 5 of EPA and related reports on the website on regular basis.
- Initiated uploading of property return details of the officers holding group "A" posts from year 2010 on website.

In addition, Air Quality Data of Agra, re-arranging industry-specific standards, advertisement for recruitments, updation of AMA related information, important activities of various divisions are displayed on the Website.

14.10 STRENGTHENING OF LOCAL AREA NETWORK AND INTERNET FACILITY

Efforts were made for uninterrupted LAN and Internet connectivity to CPCB officials of various divisions and strengthening the Computer Network at Parivesh Bhawan. Total computers on LAN with Internet connectivity are 380. The technical support was taken from NIC to ensure that the security issues are addressed in time to prevent the vulnerabilities attacking the network.

Following systems have been installed/ initiated during year 2011-2012 to provide uninterrupted LAN facility and enhance the performance:

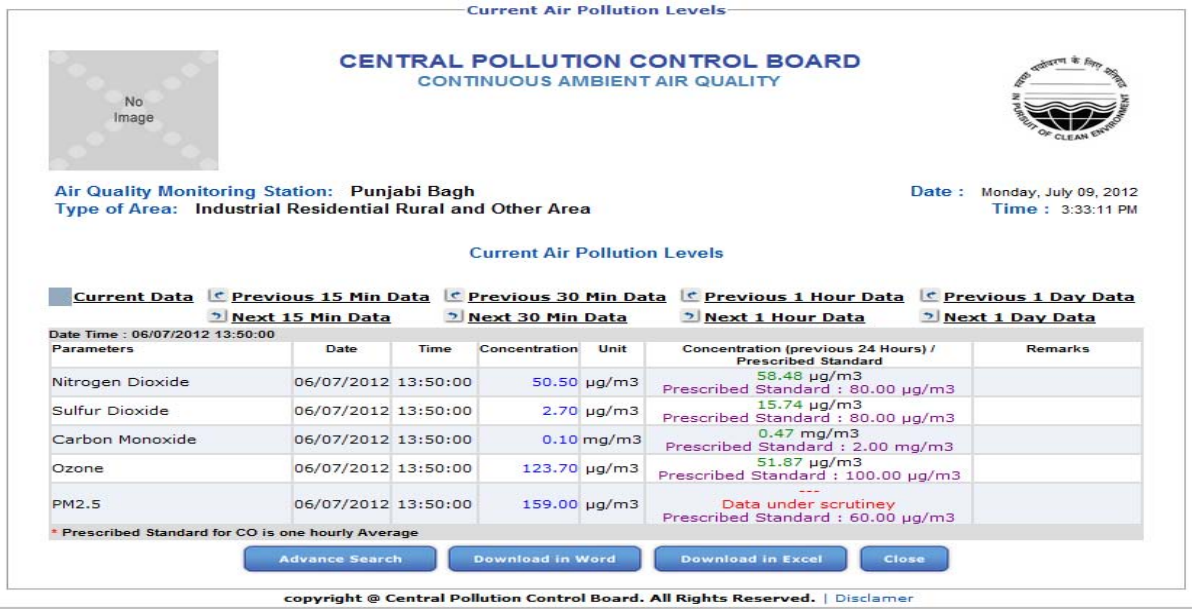
- Internet bandwidth has been enhanced to 34 MBPS
- Wireless connectivity implemented in Library, PR Division and Conference / Training Rooms.
- Wireless connectivity initiated at Central Pollution Control Board, Zonal Office, Vadodara.
- Unified Threat Management (UTM) device has been identified.
- Proxy Server, Antivirus Server and Patch Server have been updated for continuous usage of LAN system

14.11 NETWORK OF CAAQMS

A system for publishing air quality data on real-time basis from approximately 35 continuous monitoring stations had been managed. The CAAQM portal connected with 35 CAAQM stations continued to operate and data was made available. Simultaneously the data from four Delhi CAAQM Stations operated by CPCB was displayed on CPCB website.

Figure 14.6 : Network of CAAQMS

In addition to the real time CAAQM Stations networking, concept of developing single portal had been introduced in view of typical data integration issues pertaining to compatibility between various software operational in field for operating different Instruments of Ambient Air Quality, Water Quality, Noise, Emission measurements.


Current Air Pollution Levels

CENTRAL POLLUTION CONTROL BOARD
CONTINUOUS AMBIENT AIR QUALITY

No Image

Air Quality Monitoring Station: Punjabi Bagh
Type of Area: Industrial Residential Rural and Other Area

Date : Monday, July 09, 2012
Time : 3:33:11 PM

Current Air Pollution Levels

Current Data | Previous 15 Min Data | Previous 30 Min Data | Previous 1 Hour Data | Previous 1 Day Data
Next 15 Min Data | Next 30 Min Data | Next 1 Hour Data | Next 1 Day Data

Date Time : 06/07/2012 13:50:00

Parameters	Date	Time	Concentration	Unit	Concentration (previous 24 Hours) / Prescribed Standard	Remarks
Nitrogen Dioxide	06/07/2012	13:50:00	50.50	µg/m3	58.48 µg/m3 Prescribed Standard : 80.00 µg/m3	
Sulfur Dioxide	06/07/2012	13:50:00	2.70	µg/m3	15.74 µg/m3 Prescribed Standard : 80.00 µg/m3	
Carbon Monoxide	06/07/2012	13:50:00	0.10	mg/m3	0.47 mg/m3 Prescribed Standard : 2.00 mg/m3	
Ozone	06/07/2012	13:50:00	123.70	µg/m3	51.87 µg/m3 Prescribed Standard : 100.00 µg/m3	
PM2.5	06/07/2012	13:50:00	159.00	µg/m3	--- Data under scrutiney Prescribed Standard : 60.00 µg/m3	

* Prescribed Standard for CO is one hourly Average

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Figure 14.7 : Data acquisition and Data validation in Networking of CAAQMS

The concept was materialized with the installation of central software operated by four firms along with their own hardware and separate portal development. These portals contained uninterrupted operational systems.

Number of CAAQM stations connected to the server was 21 and the data from these locations is available round the clock, without any time gap and human intervention.
These software are well supported to analyze the data from statistical and environmental point of view, having integrated data validation procedure, display capability of calibration database and even can take remote access of station computer and allow to know the health of station analyzers directly. A robust and secure data acquisition and data validation, linking of stations would be in place & exponential growth in number of locations integrated to the network will be seen in future.

14.12 ONLINE ACCESS OF EMISSION DATA FROM MAJOR INDUSTRIES (OEDM)

A system for online access of emission from Pragati Power Plant in Delhi, which helps in remote monitoring of industrial emissions was successfully maintained during last four years. The connectivity continued with PPCL Delhi plant throughout the year. The correction notices were issued as and when the exceedance of limits was observed.

Figure 14.8 : Online Access of Emmission Monitoring at Pragati Power Plant Delhi

14.13 COMPUTERIZATION & DIGITIZATION OF CPCB ACTIVITIES

In house database preparation by digitizing/scanning of all existing records in all the divisions continued. The collected data has been converted into PDF format files and has been indexed with resepective division portal.

The individual portals for the divisions are under development and will be provided to each division by August 2012. It is expected that all the records will be placed systematically in each divisional portal by the target date.

14.14 ENVIRONMENTAL DATA BANK (EDB):

Web-enabled Environmental Data Bank has been set up to facilitate online entry and quick retrieval of data on various environmental parameters. On-line entry for data on air quality monitored under National Air Monitoring Programme and Water quality monitored under GEMS/MINARS is being done regularly by SPCBs/PCCs. EDB could be accessed through CPCB's website (http://www.cpcb.nic.in). Raw as well as analyzed data could be viewed, downloaded & used for further analysis/ interpretation.

The EDB application was made live after security audit clearance from NIC. The inbuilt capabilities and features of the existing EDB application were enabled for smooth functioning of EDB application. Modified EDB application is installed at NICSI, LNDC as per NIC guidelines.

Air Quality from 408 stations covering 30 States/UTs and Water Quality from 1022 stations covering 33 States/UTs are being entered online by SPCBs/PCCs.

14.15 DEVELOPMENT OF COMPUTERIZED SYSTEM FOR STREAMLINING THE PROCESS FOR INSPECTION OF INDUSTRIES AND FOLLOW-UP ACTIONS

In order to make the process of inspection and necessary follow up action more effective and transparent, a web based application has been developed for the entire process of surveillance. The system includes random selection of industries to be inspected, scheduling of inspections, database on details of inspections and follow-up actions. Cyber Security Audit of the ESS software have been completed and after getting security clearance from NIC, the application is hosted on the NIC's Production server and made live for CPCB/ZOs (URL: http:/cpcbess.gov.in).

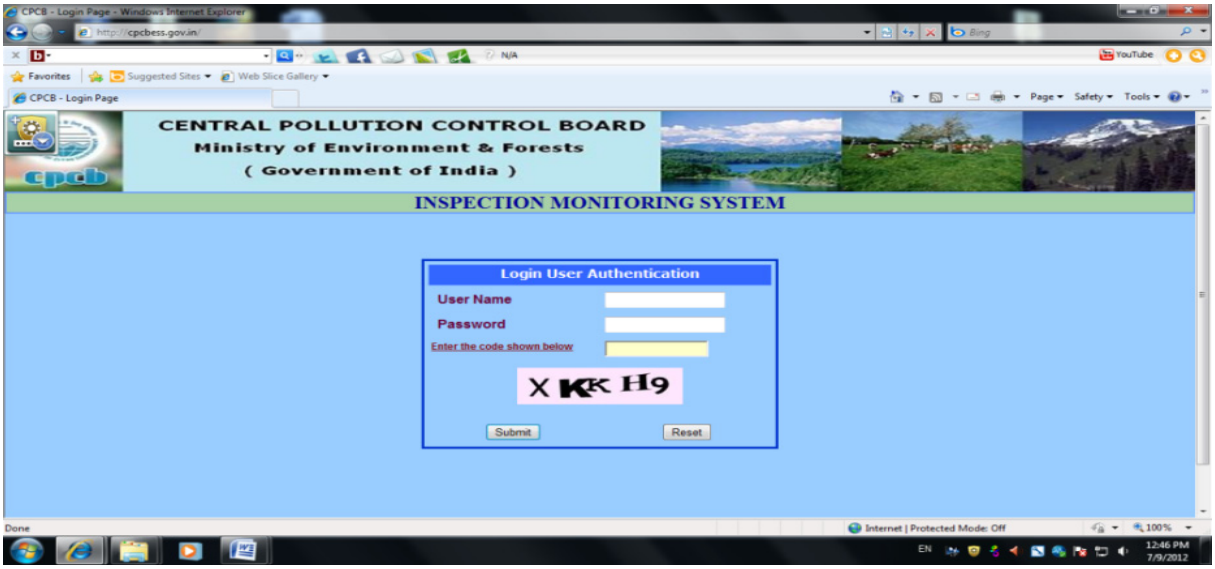


Figure 14.9 : Computerized system for steamlining of Process for Industrial

14.16 BILATERAL PROJECT WITH GOVT. OF FINLAND

A MoU was signed between Central Pollution Control Board & VTT Finland in November 2011 on 'Project for Institutional Co-operation Instrument (ICI): Capacity Building for Emission Measurements in India'. The objective of the Project is to improve the knowledge base on emission measurements in India and will involve dissemination of analytical skills in emission measurements. CPCB will play a pivotal role in dissemination of information to regulatory bodies viz. State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs). The anticipated results on completion of the project are :

a) Improved capacities in odour measurement technologies
b) Improved capacities in the measurement of fugitive emissions, especially VOCs, from organic chemical industry
c) Improved capacities in emission measurements

The first National Workshop on "Capacity Building For Emission Measurement In India" was held on February 8-9th, 2012 at India Habitat Centre, Delhi and was attended by representatives of SPCBs / PCCs. The objectives of the workshop are:

1. To understand the availability of analytical skills in emission measurement in above said focus areas in various State pollution Control Boards / Pollution Control Committees.
2. To understand the major issues in emission measurements in different State Pollution Control Boards/ Pollution Control Committees.
3. To share the Technologies/Methodologies used for the Emission Measurement in Finland.

Groundwork for conducting three Regional Workshops jointly with VTT Finland in India during year 2012-2013 has been initiated.

14.17 CLEAN TECHNOLOGY IN SMEs

The project 'Creation of database and evolving a mechanism for capacity building in the financial sector and application of fiscal instruments for clean technology projects for small & medium enterprises (SMEs)' was initiated during year 2009-2010 and is sponsored by MoEF. During year2009-10 a Clean Technology Advisory Committee (CTAC) was constituted. The project proposed to ascertain industry sector-wise; the manufacturing practices, R&D interventions, fiscal initiatives and to prepare draft guidelines for assessment of CTs in 17 identified SMEs sectors in an integrated manner. Most of the industry sectors are categorized as RED, implying highly polluting. Obsolescent technology and outdated machinery are the major growth constraints in SMEs, mainly due to shortage of necessary capital and access to modern efficient technologies, resulting in poor environmental compliance.

Based on the data from various agencies publication on "Potential for Adoption of Clean Technologies in SMEs - an introduction '(IMPACTS/16/2011-12) was brought out in the year2011. This report is a first step to 'open a window' to areas wherein technology interventions in the manufacturing processes can accomplish the goals of 'Clean Technology' for conservation of energy and material resources by reducing waste generation per unit output. As SMEs is a vast sector the sectoral studies are not exhaustive, also a verifiable database is unavailable to make a judicious assessment.

14.18 ANALYTICAL QUALITY CONTROL (AQC/WATER) FOR CENTRAL AND STATE POLLUTION CONTROL BOARDS, POLLUTION CONTROL COMMITTEES & FOR LABORATORIES RECOGNISED UNDER E.P. ACT.

The most important mandatory task Central Pollution Control Board (CPCB) is to maintain vast water quality monitoring network, with an aim to evaluate the status of water quality of different sources. In this programme the CPCB is monitoring 1019 water quality monitoring stations under GEMS, MINARS, GAP and YAP Programmes comprising rivers, lakes, wells, and ground waters spread over 27 States and 6 Union Territories through various State Pollution Control Boards (SPCB). Comparability of data within the collaborative programme becomes the key challenge to the water testing laboratories.

The quality of data must be of the desired quality to formulate the policy by the decision maker based on the data generated in the monitoring programmes. Therefore, to obtain relevant and reliable data, the analytical process has to proceed under a well established quality assurance with external proficiency test as an inherent component. To ensure the reliability of the data, a programme called "Analytical Quality Control (AQC)" was initiated with 20 laboratories during year 1991. In the year 2011-12, number of laboratories participated in this exercise have reached to 220 laboratories of SPCB/PCCs. The Environment (Protection) Act 1986 recognized laboratories. As on 22nd April 2012, 28th rounds of exercises were conducted and performance reports were communicated to the participating laboratories. There are 21 physico-chemical parameters covered under this scheme. The performance of the laboratories in the 28th Exercise for physico-chemical parameters ranged between 67 to 85 % and overall performance was around 80%.

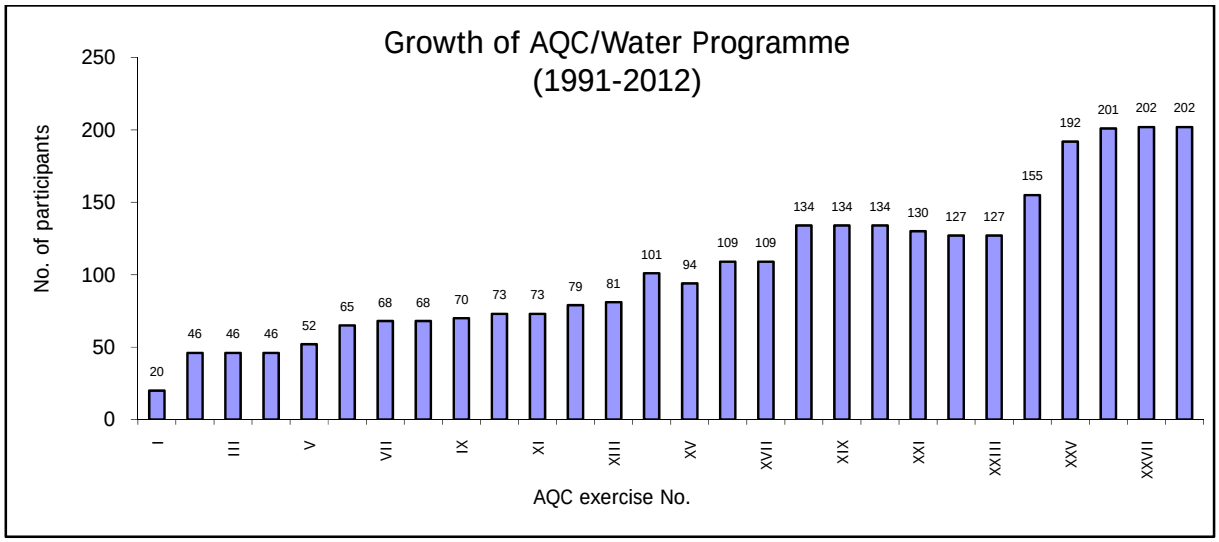


Figure 14.10 : Growth of AQC/Water Programme year 1991 to 2012

Two synthetic samples labeled as A & B of each litre volume prepared in the laboratory by adopting standard procedures and precautions are distributed to all participating laboratories by Courier service to avoid any transport delay. Samples were also analyzed in CPCB laboratory for arriving at "Reference value" for comparison and to estimate the acceptable limits of the reported values.

Table 14.17: Water Quality Parameters covered under AQC / water programme (27th & 28th Exercise) by CPCB- Delhi during Year-2011-12

S. No.	Parameter	S. No.	Parameter
01.	Conductivity	12.	Nitrate-N
02.	Total Dissolved Solids	13.	Ammonical-N
03.	Fixed Dissolved Solids	14.	Total Kjeldahl Nitrogen
04.	Total Hardness	15.	Phosphate-P
05.	Calcium	16.	Chemical Oxygen Demand
06.	Magnesium	17.	Biochemical Oxygen Demand
07.	Sodium	18.	Boron
08.	Potassium	19.	Chromium
09.	Chloride	20.	Total Suspended Solid
10.	Fluoride	21.	pH
11.	Sulphate		

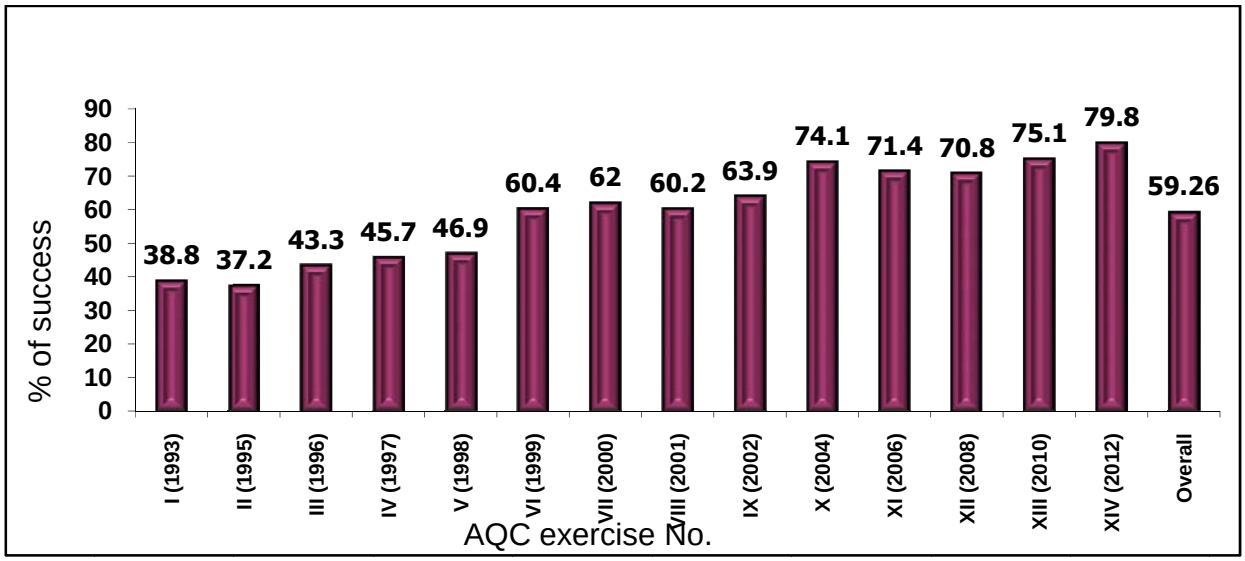


Figure 14.11 : Performance of the laboratories participated in AQC/Water Programme

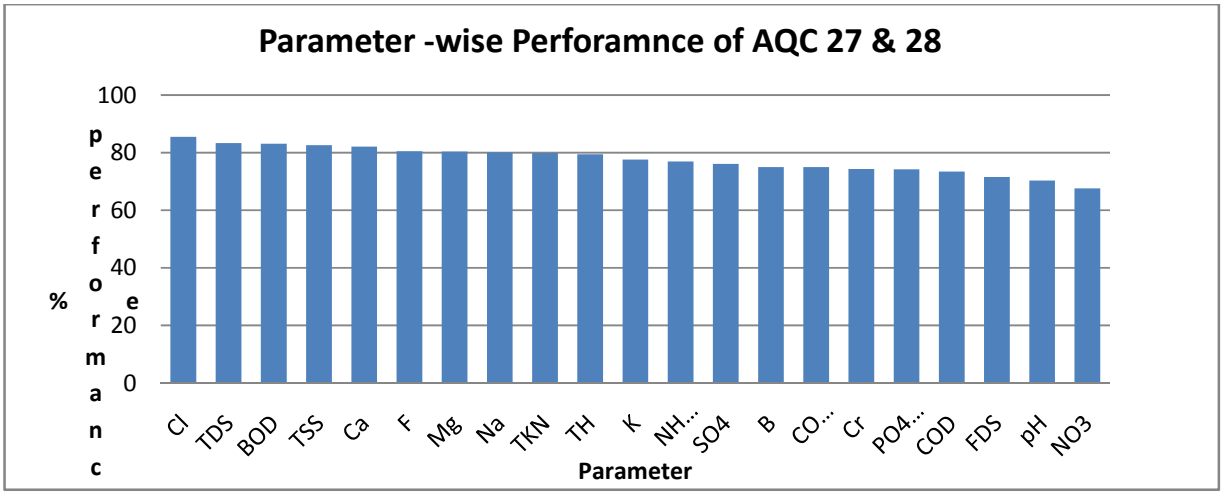


Figure 14.12 : Parameter -wise Performance of Laboratories in AQC 27 & 28

Recommendations for AQC Scheme

The overall findings of the performance of AQC exercises reveal the fact that Internal AQC system in all the laboratory has to be strengthened. The analytical capability of these laboratories could be improved by adopting the following major steps.

- Strengthening of the Internal AQC System
- Periodic calibration of instruments
- Using high quality chemicals and providing adequate quality of glassware
- Providing good quality distilled water
- Improving the laboratory work atmosphere
- Providing analytical training to laboratory analysts.
- Conducting Regional Workshop at various regions
- Adopting good quality assurance system
- Participation in Inter-laboratory AQC exercises by all laboratories of Pollution Control Boards and Committees.

14.19 INTER-LABORATORY PROFICIENCY TESTING (PT) PARTICIPATION FOR ANALYSIS OF PHYSICO-CHEMICAL AND TRACE ORGANICS PARAMETERS INCLUDING DIOXIN & FURAN

Quality assurance is the definite programme for laboratory operation that specifies the measures required to produce reliable data of known precision and accuracy. Quality system which includes quality assurance policies and all quality control processes to ensure the quality of analytical data produced by the laboratory and to demonstrate the competence of the laboratory.

To maintain the quality assurance, Central Pollution Control Board Laboratories are participating in Interlaboratory PT programmes undertaken by various national and international PT organizers having coverage of various physico-chemical, microbiological, chemical and trace organics parameters including dioxin and furan with identified reputed international PT providers.

14.20 RECOGNITION OF LABORATORIES UNDER THE ENVIRONMENT (PROTECTION) ACT, 1986

Central Pollution Control Board, Delhi has been delegated the powers by Government of India vide Gazette Notification No. SO 145 (E) dated February 21, 1991 for recognition of environmental laboratories of Govt. / Semi Govt. organization Public Sector Undertaking, Educational Institutions Central and State Pollution Control Boards under section 12(1)(b) & 13 to carry out the functions entrusted to the Environmental laboratories under the Environment (Protection) Act, 1986.

In exercise of power conferred, Central Pollution Control Board has approved the New / Renewal of recognition of following laboratories after recommendation of Expert Committee during the period April, 2011 to March, 2012:

1. Central Laboratory
   Uttar Pradesh Pollution Control Board
   PICUP Bhawan
   3rd Floor, B-Block
   Vibhuti Khand, Gomti Nagar
   Lucknow-226 010, U. P.

2. Regional Laboratory
   M.P. Pollution Control Board
   Plot No.-455/456, Vijay Nagar
   Jabalpur
   Madhya Pradesh

3. Regional Laboratory
   M. P. Pollution Control Board
   SC 17, Bharatpuri
   Ujjain-456 010, M. P.

4. Regional Laboratory
M.P. Pollution Control Board
Scheme No. 78, Part-II,
Aranya Nagar
Indore, M. P.

- Substitution of Superannuated / Transferred Govt. Analysts of Central Laboratory of Central Pollution Control Board, Delhi under Section 13 of The Environment (Protection) Act, 1986. The Board approved the substitution of superannuated / transferred Govt. Analysts with following three Govt. Analyst:

    1. Sh. P. K. Mishra, Scientist `D'
    2. Dr. (Mrs.) Pratima Akolkar, Scientist `D'
    3. Dr. P. K. Behera, Scientist `C'

14.21 PARTICIPATION IN JOINT INSPECTIONS OF PRIVATE AND GOVERNMENT LABORATORIES FOR CONSIDERATION OF NEW / RENEWAL OF RECOGNITION UNDER THE ENVIRONMENT (PROTECTION) ACT, 1986

Central Pollution Control Board has participated during the year in joint inspections of private laboratories alongwith Ministry of Environment & Forests (MoEF) and respective State Pollution Control Boards for consideration of recognition of private environmental laboratories under the Environment (Protection) Act, 1986. Central Pollution Control Board has also participated in joint inspections of government sector laboratories alongwith State Pollution Control Board/CPCB Zonal offices for consideration of their recognition under the Environment (Protection) Act, 1986.

14.22 OPERATION AND MAINTENANCE OF CENTRAL AND ZONAL LABORATORIES OF CENTRAL POLLUTION CONTROL BOARD

Since inception, CPCB has been playing a key role in abatement and control of pollution in the country by generating relevant data, providing scientific information, rendering technical inputs for formation of national policies and programmes, training and development of manpower and organizing activities for promoting awareness at different levels of the Government and public at large.

To undertake field investigations and preparation of reports on Water Quality Monitoring, Air Quality Monitoring, Industrial Inspection and many other related activities, CPCB has created zonal offices with proper analytical facilities. The

Central and Zonal Laboratories of CPCB are maintaining testing facility functions as per the requirement of ISO/IEC 17025: 2005 and accredited by NABL for various chemical and biological parameters.

The laboratories are performing analysis of various environmental components (particularly air and water) for various chemical and biological parameters.

While performing analytical works, the laboratories are taking care of all the quality control exercises required to be followed in both chemical and biological fields which also includes participation in external AQC programmes.

The Central and Zonal laboratories of Central Pollution Control Board are always conscious in adopting new analytical methods, procuring latest standard analytical methods and conducting/providing relevant trainings to personnel engaged in laboratory functions.

* * *

Annexure I

DELEGATION OF POWERS BY CENTRAL POLLUTION CONTROL BOARD TO POLLUTION CONTROL COMMITTEES

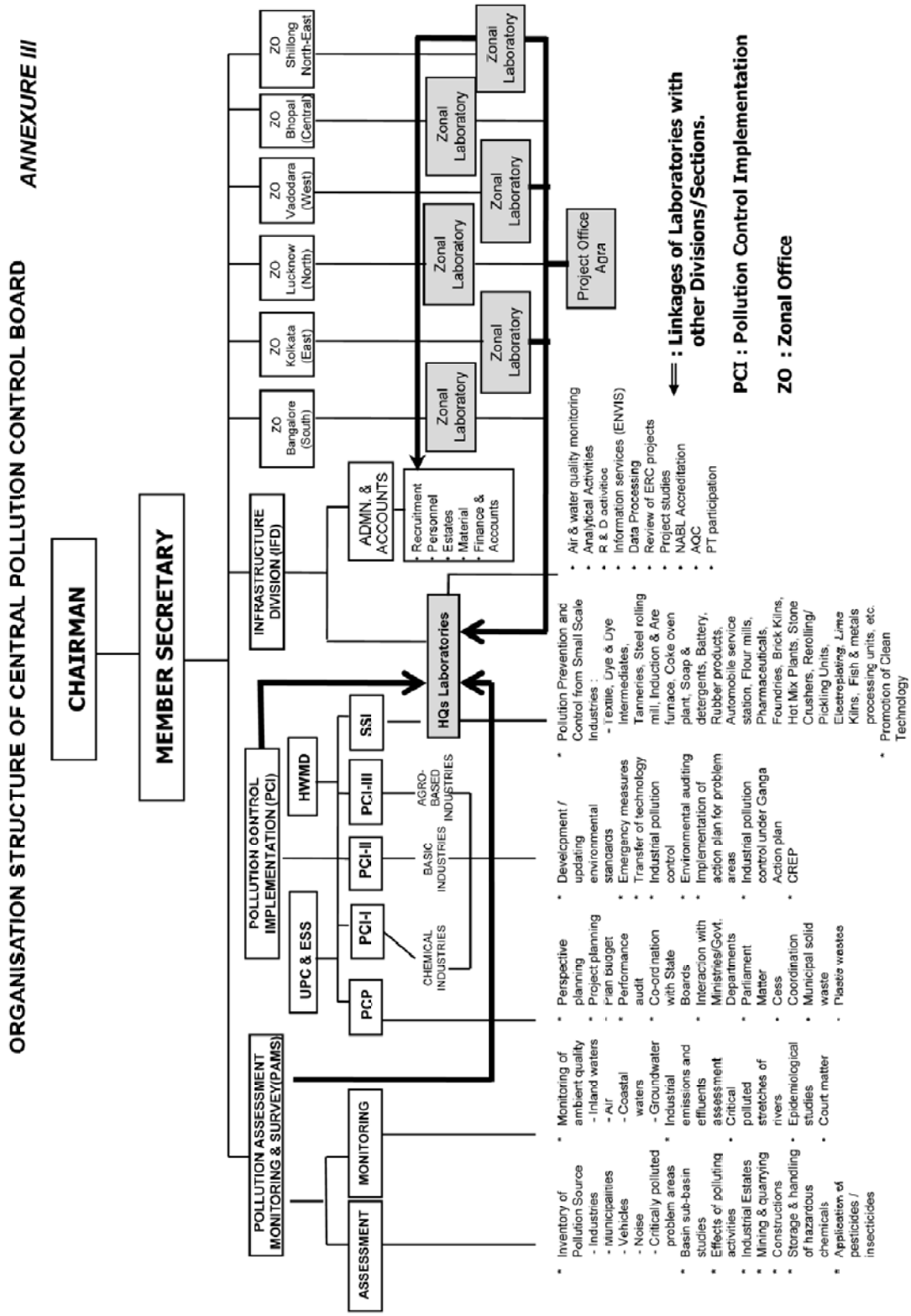
S. No	Union Territory	Pollution Control Committee	Gazette Notification No. for Power Delegation	Date of Notification
1.	**Andaman & Nicobar Islands**	The Pollution Control Committee Andaman & Nicobar Islands	Gazette of India Extraordinary, Part-II, Section-3, Sub-section (ii) S. O. No. 33 Dated 16.01.1992 & Legal /156(4) 1990 dated 3.06.2004	16.01.1992
2.	**Chandigarh**	Chandigarh Pollution Control Committee	Gazette of India Extraordinary, Part-II, Section-3, Sub-section (ii) S. O. No. 199(E) dated 15.03.1991 & S.O. 1131 (E) dated 23.10.2002	15.03.1991
3.	**Daman Diu & Dadra Nagar Haveli**	Pollution Control Committee Daman Diu & Dadra Nagar Haveli	Gazette of India Extraordinary, Part-II, Section-3, Sub-section (ii) S. O. No. 862 (E) dated 26.11.1992; amended vide notification No. S.O. 384 (E) dated 19.2.1996 and S.O. 698(E) dated 03.07.1998 File No. B-12015/7/04/AS, dated 17.12.2004	26.11.1992
4.	**Delhi**	Delhi Pollution Control Committee	Gazette of India Extraordinary, Part-II, Section-3, Sub-section (ii) S. O. No. 198 (E) dated 15.03.1991; amended vide Notification No. S.O. 640 (E) dated14.06.2002	15.03.1991
5.	**Lakshadweep**	Lakshadweep Pollution Control Committee	Gazette of India Extraordinary, Part-II, Section-3, Sub-section (ii) S. O. No 842 (E) dated 31.08.1988 & legal /156(4) 1990 dated 23.03.2006	31.08.1988
6.	**Puducherry**	Puducherry Pollution Control Committee	Gazette of India Extraordinary, Part-II, Section-3, Sub-section (ii) S. O. No. 787 (E) dated 10.03.1992; amended vide Notification No. F.No.Legal/158/(4)/90 dated 01.05.2011	10.03.1992

Annexure-II

LIST OF CPCB BOARD MEMBERS

S.No.	Name, Designation with Address	Nominated
1.	Prof. S.P. Gautam Chairman Central Pollution Control BOared 'Parivesh Bhavan',East Arjun Nagar Delhi – 110 032	**Chairman**
2.	The Joint Secretary Ministry of Mines, R.No. 325 "A" Wing, Shastri Bhavan, New Delhi – 110 001	**Member**
3.	Shri Rajiv Gauba, Joint Secretary (Handling Water Quality Monitoring Works) Ministry of Environment & Forests 'Paryavaran Bhavan', C.G.O.Complex, Lodi Road, New Delhi – 110 003	**Member**
4.	Dr. Rajneesh Dube, Joint Secretary Ministry of Environment & Forests 'Paryavaran Bhavan', C.G.O.Complex, Lodi Road, New Delhi – 110 003	**Member**
5.	Shri L.N. Gupta Joint Secretary (Refineries) Ministry of Petroleum and Natural Gas, Shastri Bhawan, New Delhi - 110 001	**Member**
6.	Ms. Gauri Kumar Additional Secretary and Financial Adviser Ministry of Environment & Forests 'Paryavaran Bhavan', C.G.O.Complex, Lodi Road, New Delhi – 110 003	**Member**
7.	Sh. A.S. Chahal Chairman, Haryana State Pollution Control Board, C-11, Sector – 6, Panchkula (HARYANA)	**Member**
8.	Prof. Subhash C. Singh Chairman, Bihar State Pollution Control Board, Beltron Bhavan, IInd floor, Jawaharlal Nehru Marg, Shastri Nagar, Patna 800023, Bihar.	**Member**

9.	Sh. Jatinder Singh Sahni Chairperson, Maharashtra Pollution Control Board, Kalpataru Points, 3-4th floors, Sion Matunga Schem Rd.No.6, Opp. Cine Planet, Sion Circle Sion (E), Mumbai-400 022.	**Member**
10.	Shri Chaudhari Jitendra Singh Mayor Allahabad Nagar Nigam, 5, Khushal Parvat, Allahabad	**Member**
11.	Shri C. V. Sankar Chairman, Tamil Nadu Pollution Control Board, No. 76, Mount Salai, Guindy, Chennai- 600 032	**Member**
12.	Shri Dipesh Sampat Mehta, Advocate Joanna Villa Co-op. Housing Society Ltd., Road No. 28, Bandra (West) Mumbai – 400 050	**Member**
13.	Ms. Seema Arora, Confederation of Indian Industry, 23, Institutional Area, Lodhi Road, New Delhi – 110 003	**Member**
14.	Mrs. Deepa Gupta, Chartered Accountant C-6/77, East of Kailash, New Delhi – 110065	**Member**
15.	Dr. (Ms.) Meenakshi Kakkar, General Manager, Environmental Management Division, Steel Authority of India Limited (SAIL), Lodhi Road, New Delhi – 110 003	**Member**
16.	Shri Jiban Mahapatra, Chief Manager (Environment), National Aluminium Company Limited (NALCO), A Govt. of India Enterprise, NALCO Bhavan, P/1, Nayapalli, Bhubaneshwar – 751 061 (Orissa)	**Member**
17.	Shri J.S. Kamyotra Member Secretary Central Pollution Control Board 'Parivesh Bhavan', East Arjun Nagar Delhi – 110 032	**Member**


ORGANISATION STRUCTURE OF CENTRAL POLLUTION CONTROL BOARD
ANNEXURE III
CHAIRMAN
MEMBER SECRETARY
POLLUTION ASSESSMENT MONITORING & SURVEY(PAMS)
ASSESSMENT
MONITORING
POLLUTION CONTROL IMPLEMENTATION (PCI)
UPC & ESS
HWMD
PCP
PCI-I
PCI-II
PCI-III
SSI
CHEMICAL INDUSTRIES
BASIC INDUSTRIES
AGRO-BASED INDUSTRIES
INFRASTRUCTURE DIVISION (IFD)
ADMN. & ACCOUNTS
HQs Laboratories
ZO Bangalore (South)
ZO Kolkata (East)
ZO Lucknow (North)
ZO Vadodara (West)
ZO Bhopal (Central)
ZO Shillong North-East
Zonal Laboratory
Project Office Agra
Recruitment
Personnel
Estates
Material
Finance & Accounts
Inventory of Pollution Source - Industries - Municipalities - Vehicles - Noise - Critically polluted problem areas
Basin sub-basin studies
Effects of polluting activities
Industrial Estates
Mining & quarrying
Constructions
Storage & handling of hazardous chemicals
Application of pesticides / insecticides
Monitoring of ambient quality - Inland waters - Air - Coastal waters - Groundwater
Industrial emissions and effluents
Epidemiological studies
Court matter
Perspective planning
Project planning
Plan budget
Performance audit
Co-ord nation with State Boards
Interaction with Ministries/Govt. Departments
Parliament Matter
Cess
Coordination
Municipal solid waste
Plastic wastes
Development / updating environmental standards
Emergency measures
Transfer of technology
Industrial pollution control
Environmental auditing
Implementation of action plan for problem areas
Industrial pollution control under Ganga Action plan
CREP
Pollution Prevention and Control from Small Scale Industries :
- Textile, Dye & Dye Intermediates,
Tanneries, Steel rolling mill, Induction & Arc furnace, Coke oven plant, Soap & detergents, Battery, Rubber products, Automobile service station, Flour mills, Pharmaceuticals, Foundries, Brick Kilns, Hot Mix Plants, Stone Crushers, Rerolling/ Pickling Units, Electroplating, Lime Kilns, Fish & metals processing units, etc.
Promotion of Clean Technology
Air & water quality monitoring
Analytical Activities
R & D activities
Information services (ENVIS)
Data Processing
Review of ERC projects
Project studies
NABL Accreditation
AQC
PT participation
: Linkages of Laboratories with other Divisions/Sections.
PCI : Pollution Control Implementation
ZO : Zonal Office

Annexure – IV

SANCTIONED STAFF STRENGTH IN CPCB AND NUMBER OF VACANCIES IN EACH CADRE AS ON 31.03.2012

Sl. No.	Name of the Post	Sanctioned	Filled			Vacant	Deemed abolished/ approval for revival awaited
			Regular/ Dep.		Ad-hoc		
1	Scientist 'F' - 02	168*	2	-	24	-	-
2	Scientist 'E' - 08		6	-		-	-
3	Scientist 'D' - 22		45	-		-	-
4	Scientsit 'C' - 60		38	-		-	-
5	Scientist 'B' - 76		52	-		1	-
6	Senior Law Officer	1	-	-	1	-	-
7	Finance & Account Officer	1	-	-	1	-	-
8	Sr. Administrative Officer	1	-	-	1	-	-
9	Administrative Officer	7	4		3		-
10	Law Officer	2	2	-	-	-	-
11	Assistant Law Officer	2	2	-	-	-	-
12	Hindi Officer	1	1	-	-	-	-
13	Accounts Officer	2	2	-	-	-	-
14	Assistant Accounts Officer	5	5	-	-	-	-
15	Assistant Technical Officer	1	-	-	1	-	-
16	Section Officer	10	9	-	1	-	-
17	Private Secretary	1	1	-	-	-	-
18	Senior Technical Supervisor	9	8	-	1	-	-
19	Draughting Supervisor	1	1	-	-	-	-
20	Deputy Librarian	1	-	-	-	1	-
21	Senior Scientific Assistant	35	33	-	1	-	1
22	Senior Hindi Translator	1	1	-	-	-	-
23	Technical Supervisor	10	2	-	8	-	-
24	Assistant	19	17	2	-	-	-
25	Data Processing Assistant	4	-	1	3	-	-
26	Senior Draughtsman	2	2	-	-	-	-
27	Junior Enginner (E & M)	1	1	-	-	-	-
28	Junior Enginner (Civil)	1	-	-	1	-	-
29	Personal Assistant (5)	1	1	-	-	-	-
30	Accounts Assistant	8	8	-	-	-	-

31	Junior Hindi Translator	1	1	-	-	-	-
32	Publication Assistant	1	1	-	-	-	-
33	Junior Scientific Assistant	35	28	1	-	-	6
34	Senior Technician	12	8	3	-	-	1
35	Junior Technician	7	7	-	-	-	-
36	Senior Laboratory Assistant	32	28	-	1	-	3
37	Junior Laboratory Assistant	38	27	-	4	-	7
38	Field Attendant	7	7	-	-	-	-
39	Upper Division Clerk	24	21	-	3	-	-
40	Lower Division Clerk	35	20	-	-	13	2
41	Senior Attendant	15	15	-	-	-	-
42	Driver Special Grade	1	1	-	-	-	-
43	Driver Grade-I	7	7	-	-	-	-
44	Driver Grade-II	6	1	-	5	-	-
45	Driver (Ordinary)	8	6	-	2	-	-
46	Data Entry Operator Grade-I	2	1	-	1	-	-
47	Data Entry Operator Grade-II	8	6	-	-	-	2
48	Junior Draftsman	1	-	-	-	1	-
49	Stenographer	20	3	-	-	15	2
50	Cashier	6	-	-	-	6	-
51	Pump & Wheel Valve Operator	2	1	-	-	-	1
52	Plumber	1	1	-	-	-	-
53	Attendant	39	22	-	-	8	9
	Total	**603**	**455**	**7**	**62**	**45**	**34**

** Total number of scientific posts at the time of induction of the Flexible Complementing Scheme (Interchangeable)*

- 02 posts of Scientist D (one Sr. Env. Engineer and one Sr. Scientist Sl. No. 3), 02 posts of Scientist B (Sl. No. 5), 02 posts of Senior Scientific Assistant (Sl. No. 21) and 02 posts of Junior Scientific Assistant (Sl. No. 33) are sanctioned under HWMD for which approval for continuation is awaited.
- One post of Assistant Technical officer (Sl.No. 15) & one post of Data Processing Assistant (Sl.No. 25) are sanctioned; however approval for Recruitment Rules are still awaited.
- Four posts of Personal Assistant have been upgraded to Private Secretary (Sl. No. 29).
- Five post of Sr. Technician are abolished, however, four posts are filled up due to exigency of work. (Sl. No. 34).

Annexure – V

POST CREATED BY THE CENTRAL POLLUTION CONTROL BOARD AFTER THE NOTIFICATION OF CPCB REGULATIONS, 1995 AND FOR WHICH CONCURRENCE OF GOVERNMENT IS AWAITED.

Sl. No.	Name of the post	Approved by the CPCB	Filled		Unfilled
			Regular/Dep.	Ad-hoc	
1	Assistant Law Officer	1	-	-	1
2	Sr. Hindi Officer	1	-	-	1
3	Accounts Assistant	6	-	-	6
4	Private Secretary (19 posts upgraded from Personal Assistant)	19	19	-	-
5	Senior Hindi Translator	1	-	-	1
6	Junior Hindi Translator	7	-	-	7
7	Hindi Typist (LDC)	7	-	-	7
8	Driver Grade II	3	-	-	3
9	Attendant (Safaiwala)	10	-	8	2
10	Field Attendant	11	-	-	11
	Total	**66**	**19**	**8**	**39**

05 sanctioned posts and 14 Board created posts of Personal Assistant upgraded to Private Secretary and filled up on regular basis in view of exigency of work (Sl. No. 4).

Annexure-VI

STATEWISE STATUS OF ENVIRONMENTAL LABORATORIES (GOVT./ SEMI-GOVT./ PUBLIC SECTOR UNDERTAKINGS/ EDUCATIONAL INSTITUTES) HAVING VALID RECOGNITION UNDER THE ENVIRONMENT (PROTECTION) ACT, 1986

(As on 31st March, 2011)

S. No.	State/Union Territory	Name and address of Laboratories
1	**Andhra Pradesh**	Central Laboratory Andhra Pradesh Pollution Control Board A-3, Industrial Estate Sanathnagar Hyderabad-500 018
		Environment Protection Training and research Institute (EPTRI) 91/4, Gachi Bowli, Hyderabad- 500032 Andhra Pradesh
2	**Arunachal Pradesh**	-
3	**Assam**	Central Laboratory Pollution Control Board, Assam Bamunimaidam Guwahati-781 021, Assam
4	**Bihar**	-
5	**Chhattisgarh**	-
6	**Goa**	Goa State Pollution Control Board EDC Plaza Patto, Panaji, Goa-403 001
7	**Gujarat**	Zonal Office Laboratory, Central Pollution Control Board Synergy House-II Gorwa Subhanpura Road Subhanpura Vadodara-390 023 Gujarat
		Gujarat Pollution Control Board Regional Office - Surat 338, Typical First Floor

S. No.	State/Union Territory	Name and address of Laboratories
		Belgium Square Silver Plaza Complex Opp. Linear Bus Stand, Ring Road Surat-395 003, Gujarat
		Gujarat Pollution Control Board Regional Office Laboratory- Vadodara Geri Compound Race Course, Opp. S. T. Depot Vadodara-390 007 Gujarat
		Regional Office Laboratory- Rajkot Gujarat Pollution Control Board Race Course, Ring Road Near Union Bank, Rajkot-360 001, Gujarat
8	**Haryana**	-
9	**Himachal Pradesh**	-
10	**Jammu & Kashmir**	-
11	**Jharkhand**	Environmental Laboratory Central Mine Planning & Design Institute Limited Gondwana Place Kanke Road Ranchi-834 008, Jharkhand
12	**Karnataka**	-
13	**Kerala**	-
14	**Maharashtra**	Regional Laboratory Maharashtra Pollution Control Board Jog Centre , 3rd Floor, Pune- Mumbai Road, Shivaji Nagar, Pune-411003
		P.G. Department of Environment Management Chhatrapati Shahu Institute of Business Education and Research (SIBER), University Road, Kolhapur- 416004 Maharashtra
		Regional Laboratory Maharashtra State Pollution Control Board 6th Floor, "Udyog Bhawan" Civil Lines

S. No.	State/Union Territory	Name and address of Laboratories
		Nagpur-440001 Maharashtra
		Regional Laboratory Maharashtra State Pollution Control Board 1st Floor, Udyog Bhawan, Rathi Chowk, Trimbak Road Nashik-422007 Maharashtra
		Regional Laboratory Maharashtra State Pollution Control Board "Paryavaran Bhavan" A-4/1, Chikalthana MIDC, Behind Dhoot Hospital, Aurangabad- 431210 Maharashtra
15	**Manipur**	-
16	**Madhya Pradesh**	Central Laboratory Madhya Pradesh Pollution Control Board "Paryavaran Parisar", E-5, Arera Colony Bhopal-462 016, M. P.
		Central Laboratory National Fertilizers Limited Vijaipur Unit,Vijaipur-743 111 Tehsil - Raghogarh Dist. Guna, M. P.
		Regional Laboratory M.P. Pollution Control Board Plot No, 455/456, Vijay Nagar, Jabalpur-482002 Madhya Pradesh
		Regional Laboratory M.P. Pollution Control Board Sc-17 Bharatpuri Ujjain-456010, Madhya Pradesh
		Regional Laboratory M.P. Pollution Control Board Scheme No.-78 Part-II, Aranya Nagar Indore-452010 Madhya Pradesh

S. No.	State/Union Territory	Name and address of Laboratories
17	**Meghalaya**	-
18	**Mizoram**	-
19	**Nagaland**	-
20	**Odisha**	-
21	**Punjab**	Central Laboratory Punjab Pollution Control Board Vatavaran Bhawan, Patiala, Punjab-147001
		Punjab Bio- Technology Incubator Agri. And Food, testing Laboratory SCO: 7 & 8 (Top Floor), Phase-V, SAS Nagar, Mohali-160059 Punjab.
22	**Rajasthan**	-
23	**Sikkim**	-
24	**Tamil Nadu**	-
25	**Tripura**	-
26	**Uttarakhand**	Pollution Control Research Institute Bharat Heavy Electricals Limited Ranipur, Haridwar-249 403 Uttarakhand
27	**Uttar Pradesh**	Eco-Auditing Laboratory National Botanical Research Institute Rana Pratap Marg Lucknow-226 001 U. P.
		Environmental Management Division Central Pulp & Paper Research Institute Post Box No. 174 Paper Mills Road, Himmat Nagar Saharanpur-247001, U.P.
		Central Laboratory Uttar Pradesh Pollution Control Board PICUP Bhawan, 3rd Floor B- Block Vibhuti Khand, Gomati Nagar Lucknow-226010 U.P.
28	**West Bengal**	Zonal Laboratory Central Pollution Control Board,

S. No.	State/Union Territory	Name and address of Laboratories
		Zonal Office , Kolkata 502, Southend Conclave, 1582 Rajadanga Main Road Kolkata – 700107
29	**Andaman & Nicobar**	-
30	**Chandigarh**	-
31	**Diu & Daman**	-
32	**Dadra & Nagar Haveli**	-
33	**Delhi**	Central Laboratory Central Pollution Control Board Parivesh Bhawan East Arjun Nagar Delhi-110032
34	**Lakshadweep**	-
35	**Puducherry**	-

Annexure-VII

Printing jobs executed during the financial year 2011-12

1. Comparative studies for lignin and tanneries removal from pulp and paper with effluent by selection coagulants/oxidants/ adsorbents : IMPACTS/15/2010-11
2. Potential for adoption of Clean Technologies in SMEs – an introduction : IMPACTS/16/2011-12
3. National Ambient Air Quality Status 2009 : NAAQMS/34/2010-11
4. Status of Water Quality in India 2009: MINARS/33/2009-10
5. Parivesh Newsletter : 'New Persistent Organic Pollutant Brominated Flame Retardants (BFRs) Environmental Concern'
6. Annual Action Plan 2011-12
7. Booklet on 'Ganga Basin in UP'
8. Brochure on 'Lyophilization a Green Technology for Salt-less Preservation of Hides and Skins' (in Hindi & English)
9. Jal Pradushan (Hindi)
10. Ganga Nadi Ki Himalayee Dwara (Bhagirathi) Se Sambandith Samassyaye
11. Status of Water Quality in India 2010 : MINARS/34/2010-11
12. Study on Environment Management in the Bee-Hive Coke Oven Plants in Assam and Meghalaya
13. Vaiganik Evam Takniki Lekhon Ka Sankalan 2010
14. Environmentally Sound Management of Mercury Waste generated in Health Care Facilities : HAZWAMS/39
15. Report on 'Paryavaran Darshan'
16. National Ambient Air Quality Status & Trends in India 2010 : NAAQMS/35/2011-12
17. Guidelines Manual on Water & Waste Water Analysis :CUPS/78

Abbreviations used in the Report

Sl. No.	Abbreviation	Enlargement/Expansion
01.	CPCB	Central Pollution Control Board
02.	SPCB	State Pollution Control Board
03.	PCC	Pollution Control Committee
04.	CPAs	Critically Polluted Areas
05.	MoEF	Ministry of Environment and Forests
06.	CEPI	Comprehensive Environmental Pollution Index
07.	CNG	Compressed Natural Gas
08.	GPCB	Gujarat Pollution Control Board
09.	BOD	Bio-Chemical Oxygen Demand
10.	COD	Chemical Oxygen Demand
11.	TC	Total Coliform
12.	CETP	Common Effluent Treatment Plant
13.	AWRS	Ash Water Recirculation System
14.	NTF	National Task Force
15.	CREP	Corporate Responsibility for Environmental Protection
16.	NCEF	National Clean Energy Fund
17.	DPRs	Detailed Project Reports
18.	TEC	Technical Experts Committee
19.	PSC	Project Steering Committee
20.	HWMD	Hazardous Waste Management Division
21.	IIT	Indian Institute of Technology
22.	NGRI	National Geophysical Research Institute
23.	NPC	National Productivity Council
24.	NCPCR	National Commission for Protection of Child Rights
25.	UPPCB	Uttar Pradesh Pollution Control Board
26.	GAP	Ganga Action Plan
27.	NWQMP	National Water Quality Monitoring Programme
28.	BWQC	Biological Water Quality Criteria
29.	TTZ	Taj Trapezium Zone
30.	NRCD	National River Conservation Directorate
31.	NGRBA	National Ganga River Basin Authority
32.	STP	Sewage Treatments Plants
33.	NCR	National Capital Region
34.	NAMP	National Air Quality Monitoring Programme
35.	SO_2	Sulphur Dioxide
36.	NO_2	Nitrogen Dioxide
37.	RSPM	Respirable Suspended Particulate Matter
38.	VOCs	Volatile Organic Compounds
39.	NANMN	National Ambient Noise Monitoring Network
40.	GW	Ground Water
41.	PAHs	Polycyclic Aromatic Hydrocarbons
42.	PCBs	Poly Chlorinated Biophenyls
43.	POPs	Persistant Organic Pollutants
44.	MPCB	Maharastra Pollution Control Board
45.	MSW	Muncipal Solid Waste
46.	AOX	Adsorbable Organic Halogens
47.	BRTs	Bus Rapid Transit System
48.	AQC	Analystical Quality Control
49.	YAP	Yamuna Action Plan
50.	GEMS	Global Environmental Monitoring System
51.	MINARS	Monitoring of Indian National Aquatic Resources System
52.	CTAC	Clean Technology Advisory Committee
53.	LCA	Life Cycle Assesment

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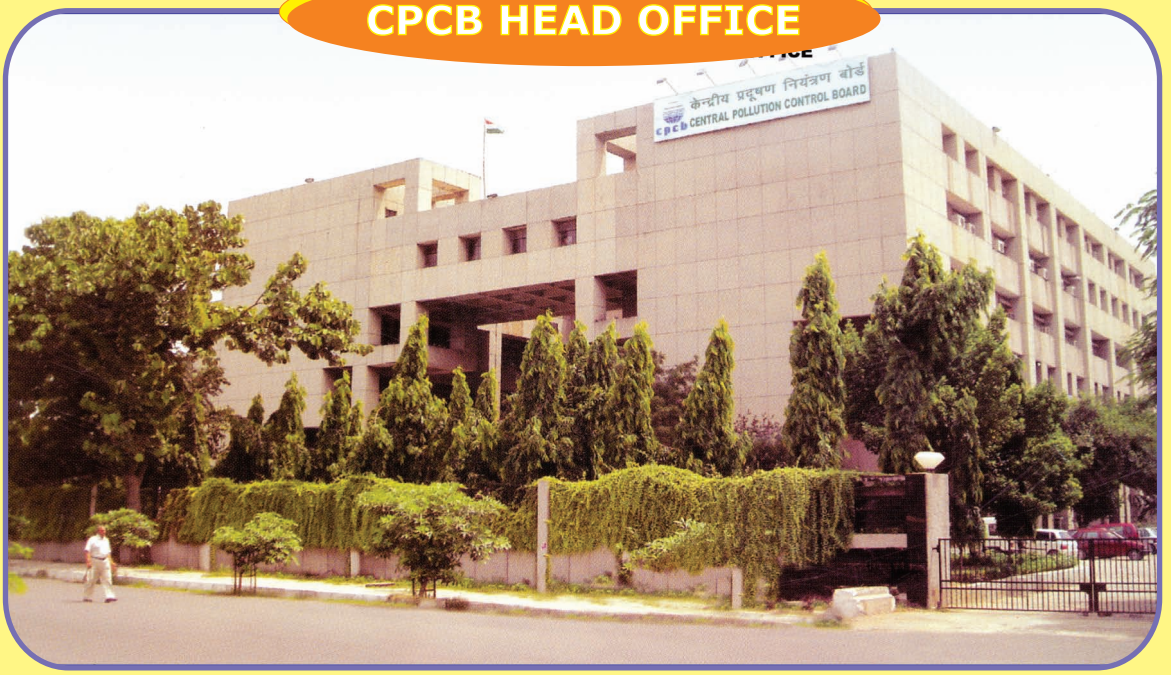

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