Annual Report 2012-13

Central Pollution Control Board
Ministry of Environment & Forests
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ANNUAL REPORT
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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)**.

* * *

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 2012 - 2013 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, 2013 is furnished in **Annexure-IV & V**.

* * *

CHAPTER III

MEETINGS OF CENTRAL POLLUTION CONTROL BOARD

3.1 MEETINGS OF THE CENTRAL BOARD

During the reporting period (i.e. April 1, 2012 to March 31, 2013), two meetings of the Central Board were held as under:

S. No.	Meeting No.	Date	Place
1.	162nd	September 07, 2012	CPCB, Delhi
2.	163rd	March 22, 2013	MoEF, New Delhi

3.2 MAJOR DECISIONS TAKEN BY THE BOARD

1. Approved the CPCB Annual Audit Report for the Financial Year 2010 – 2011.
2. Approved the NOx & SO_2 Emission Standards and Load Based Standards for Particulate Matter (PM) including Revision of PM Emission Standards for Cement Industry.
3. Approved the revision of Emission norms for Petrol and Kerosene driven Gensets.
4. Approved the Revision of Emission norms for Genset Diesel Engines up to 800 kW.
5. Approved the Proposed effluent and emission standards for Dyes and dye intermediate units.
6. Approved the Annual Report for the Year 2010 -11.
7. Approved the Annual Action Plan 2012-13.
8. Approved the Standards for Noise and Emission limit for LPG and Natural Gas driven Gensets.
9. Resolved the Appeal under the Provisions of CCS(CCA) Rules, 1965 made by Shri Arjun Bhalla against the order of the Disciplinary Authority for imposing penalty of dismissal from service.
10. Approved the Opening of New Zonal Offices (ZOs) at Chandigarh & Chennai.
11. Approved the Annual Report of CPCB for the year 2011-2012.
12. Approved the CPCB Annual Audit Report for the Financial Year 2011 – 2012.

3.3 NATIONAL CONFERENCE/MEETING ON NATIONAL MANUFACTURING POLICY

The interactive meeting of Chairmen and Member Secretaries of the State Pollution Control Board/Pollution Control Committees (SPCBs/PCCs) was organised April 17, 2012 at New Delhi. Over 60 participants from 15 SPCBs / PCCs, MoEF, DIPP and

CPCB attended the meeting.

The major issues discussed during the meeting are as follows:

- Third Party Inspections;
- Placement of designated officer at NIMZ;
- Environmental Impact Assessment clearances for the NIMZ;
- Water Cess; and
- Strengthening of Ambient Air Quality Monitoring Network in India.

3.4 NATIONAL WORKSHOP ON "CAPACITY BUILDING FOR EMISSION MEASUREMENT IN INDIA"

The first National Workshop on "Capacity Building for Emission Measurement In India" was held on February 8-9, 2012 at India Habitat Centre, Delhi and was attended by representatives of SPCBs / PCCs. The objectives of the workshop are:

- To understand the availability of analytical skills in emission measurement in above said focus areas in various State pollution Control Boards / Pollution Control Committees.
- To understand the major issues in emission measurements in different State Pollution Control Boards/ Pollution Control Committees.
- To share the Technologies/ Methodologies used in the Emission Measurement in Finland.

3.5 WORKSHOP FOR SPONGE IRON SECTOR

India is the largest producer of sponge iron in the world and it plays key role in development of steel sector as per National Steel Policy. Sponge iron plants are comparatively low cost industries with low gestation period, leading to little concern for environment. In view of environmental challenges of sponge iron sectors , a workshop with the stakeholders was organized at Kolkata on April 5, 2013 to share the knowledge / experience, critically analyze environmental issues and prepare a road map for improving overall environmental performance of the sector.

3.6 WORKSHOP ON NAMP/NWMP AT BHOPAL

Two days Regional workshop on NAMP/NWMP was organized at Bhopal on 7 & 8 February, 2013. The objective of the workshop was to ensure and verify the accuracy/ quality of monitoring data of NAMP and NWMP being received from SPCBs through various monitoring stations and to resolve the field problems and to provide the technical and scientific guidance to SPCBs. The observations have been

communicated to the concerned SPCBs regarding data gap reflected in reporting to CPCB. During the field visit demonstration of water sampling and bio-monitoring of river Narmada along with operation of $PM_{2.5}$ sampler was also conducted to make aware the field staff of SPCBs about its operation and calibration.

3.7 WORKSHOP ON CO-INCINERATION OF HAZARDOUS WASTE IN VARIOUS INDUSTRIAL SECTORS IN CENTRAL ZONE

CPCB is promoting the concept of co-processing in industrial sectors like Thermal Power Plants, Cement and Steel for energy and resource conservation. Therefore one day International workshop on 'Co-incineration of Hazardous waste in various industrial sectors in Central Zone has been jointly organized by CPCB and SINTEF, Norway on November 1, 2012. More than one hundred and fifty participants from various industrial sector and regulatory body attended the workshop. Number of papers, case studies on co-processing/incineration of hazardous waste in cement plants was presented by the expert member, representative of cement industries and regulatory authorities.

3.8 WORKSHOP UNDER MALÉ DECLARATION

Central Pollution Control Board is recognized as Regional Centre for Dry & wet deposition studies in South Asia in 2012 as training and capacity building programs under the Malé Declaration on Control and Prevention of Air Pollution and its Transboundary Effects. The CPCB plays a vital role in the implementation of the program and as a continuing activity, the 9th Refresher Workshop; a capacity building programme for the National Implementing Agencies of Malé Declaration was conducted in Delhi during December 10-12, 2012. Participants from all member countries (Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan & Sri Lanka) attended the workshop.

3.9 INTERACTION MEETS ON BIO-MEDICAL WASTE MANAGEMENT

Central Pollution Control Board has conducted two 'Interaction Meets' in the month of September, 2012 with the Common Bio-medical Waste Treatment Facility Operators of southern, eastern and north eastern zones of the country and requested all the CBWTFs for ensuring effective implementation of the BMW Rules.

* * *

CHAPTER IV

COMMITTEES CONSTITUTED BY THE BOARD & THEIR ACTIVITIES

4.1 NATIONAL TASK FORCE FOR INTEGRATED IRON & STEEL PLANT

A meeting of NTF was held on December 14, 2012 at SAIL, Delhi to review status of implementation of action points and revise time targets. Significant progress is made by National Task Force (NTF) in implementing action points identified under Corporate Responsibility for Environmental Protection (CREP). Specific water consumption has been reduced considerably; most plants are utilizing 100% Blast furnace slag, doing direct injection of reducing agent in Blast Furnace and are compliant with PLD, PLL and PLO standards

4.2 COMMITTEES IN WHICH CPCB IS A MEMBER RELATED TO VEHICULAR POLLUTION CONTROL

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

* * *

CHAPTER V

AIR AND WATER QUALITY MONITORING

5.1 WATER QUALITY MONITORING IN INDIA

5.1.1 National Water Quality Monitoring Programme (NWQMP)

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, 10 Water Treatment Plant (Raw Water) and 807 Wells. Among the 2500 stations, 1275 are on rivers, 190 on lakes, 45 on drains, 41 on canals, 12 on tanks, 41 on creeks/seawater, 79 on ponds, 10 Water Treatment Plant (Raw Water) and 807 are groundwater stations. Presently the inland water quality-monitoring network is operated under a 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 analysed for 9 core parameters and 19 general parameters. The monitoring agencies have also analysed the trace metals at few locations. The water quality data on rivers, lakes, ponds, tanks and groundwater locations being monitored under the network is evaluated against the water quality criteria and the monitoring locations in exceedence with respect to one or more parameters are identified as polluted and require action for restoration of water quality. The locations on rivers, lakes, ponds, tanks and groundwater not meeting the criteria are briefly summarized.

The monitoring results obtained during year 2011 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 the indication of extent of water quality degradation in different parts of our country. It is observed that nearly 63% of the observations are having BOD less than 3 mg/l, 19% between 3-6 mg/l & 18% above 6 mg/l. Similarly Total & Faecal coliform which indicate presence of pathogens in water are also a major concern. About 50% observations are having Total Coliforms and 69% observations are having Faecal Coliform less than 500 MPN /100 ml.

5.1.1.1 Lowest Observed D.O. Levels In Rivers

The level of DO was observed more than 4 mg/l in river Narmada, Brahmani, Baitarni and Ganga throughout the year to sustain aquatic life whereas, the values less than 4 mg/l have been observed in stretches of rivers at a number of locations downstream of urban settlements due to discharge of untreated/partially treated municipal wastewater which is responsible for high oxygen demand. During year

2011 the lowest Dissolved Oxygen (DO) (one of the most important indicators of pollution) levels observed in rivers are arranged in ascending order summarised in Table 5.1.

Table 5.1: Lowest observed Dissolved Oxygen (DO) levels in Rivers

Rivers	DO (mg/l)	Rivers	DO (mg/l)
Bharalu, Churni, Hindon, Karamana, Mathabhanga, Sirsa & Yamuna	0	Mula-Mutha & Panchaganga	1.3
Nambul & Nuton Basti	0.2	Damanganga & Nira	1.4
Dwarka, Kadambayar & Kalingarayan Canal	0.3	Indrayani & Rihand	1.5
Vindyadhari	0.4	Kodra Dam & Suswa	1.6
Banas & Vasista	0.5	Cauvery, Krishna, Muneru & Bandi	1.7
Irumpanam, Musi & Sarabanga	0.6	Pedhi & Ghaggar	1.8
Mutha & Kala Amb	0.8	Ram Rekha	2
Thirumanimuthar	0.9	Maner	2.1
Dhansiri, Mula & Pawana	1	Deepar Bill & Vel	2.3
Bhima & Kolak	1.1	Periyar	2.4
Godavari, Kshipra, Mithi & Sukhana	1.2	Gomti & Savitri	2.5
Rupnarayan	2.6	Mapusa & Ramapuram	3.3
Ghod, Kalu, Manjra & Purna	2.7	Damodar	3.4
Chambal & Manjeswar	2.8	Disang	3.5
Imphal, Kallai, Puzhackal, Venna & Wangjing	2.9	Bhavani, Chathe, Thirur, Waghur & Wardha	3.6
Coringa, Darna, Dzu, Panam & Subarnarekha	3	Kundalika, Lokchao & Ujad	3.7
Arkavathi,Kanhan, Lilong, Parvati & Penganga	3.1	Gour, Patalganga & Satluj	3.8
Jawai Dam, Lakshmantirtha, Kali Sindh, Mahi,Tapi & Wena	3.2	Sal, Pennar, Sina & Wainganga	3.9

5.1.1.2 Highest Observed Coliform Levels In Rivers

- Total Coliform and Faecal Coliform count (one of the most important indicators of pollution) have been observed very high in rivers at a number of locations. The river Mahi and Pennar are relatively clean rivers as the number of Total Coliform and Faecal Coliform count are respectively less than criteria limit of 5000 MPN/100 ml and 2500 MPN/100 ml respectively. The highest TC & FC levels observed in rivers are summarised in Table 5.2.

Table-5.2: Highest observed Total Coliform & Fecal Coliform levels in Rivers

Rivers	Total Coliform (MPN/100ml)	Fecal Coliform (MPN/100ml)	Rivers	Total Coliform (MPN/100ml)	Fecal Coliform (MPN/100ml)
Yamuna	16×10^8	11×10^8	Ramganga	28×10^3	7×10^3
Kalinadi	11×10^8	11×10^7	Daha	24×10^3	9×10^3
Kalinadi (E)	11×10^8	46×10^7	Dwarakeshwar	24×10^3	21×10^2
Hindon	93×10^5	43×10^6	Mayurakshi	24×10^3	8×10^3
Matha Bhanga	9×10^6	5×10^6	Ram Rekha	24×10^3	9×10^3
Damodar	8×10^6	175×10^4	Rushikulya	24×10^3	13×10^3
Churni	3×10^6	24×10^5	Sirsa	24×10^3	9×10^3
Ganga	25×10^5	11×10^5	Tapi	24×10^3	43×10^2
Karola	22×10^5	26×10^4	Karamana	22×10^3	11×10^3
Mahananda	17×10^5	39×10^4	Birupa & Ib	17×10^3	13×10^3
Kansi	16×10^5	14×10^4	Bhima	16×10^3	16×10^3
Rupnarayan	16×10^5	17×10^4	Irumpanam	16×10^3	35×10^2
Silabati	16×10^5	35×10^4	Kagina, Krishna & Tunghabhadra	16×10^3	9×10^3
Thirumanimuthar	16×10^5	92×10^4	Bharalu	15×10^3	2×10^3
Vasista	16×10^5	92×10^4	Bhogdoi	15×10^3	910
Sarabanga	92×10^4	54×10^4	Brahmaputra	15×10^3	730
Suswa	72×10^4	15×10^4	Deepar Bill	15×10^3	3×10^2
Teesta	39×10^4	225×10^3	Kerandi	15×10^3	43×10^2
Kaljani	32×10^4	26×10^4	Kharasrota	14×10^3	94×10^2
Vindyadhari	28×10^4	22×10^4	Sai	14×10^3	11×10^3
Dwarka	16×10^4	9×10^4	Serua	13×10^3	79×10^2
Barakar	16×10^4	3×10^4	Vansadhara	94×10^2	49×10^2
Betwa	16×10^4	11×10^4	Purna	93×10^2	23×10^2
Kathajodi & Mahanadi	16×10^4	16×10^4	Palar	92×10^2	17×10^2
Gomti	13×10^4	94×10^3	Kadambayar	9×10^3	16×10^2
Alaknanda	11×10^4	46×10^3	Puzhackal	9×10^3	9×10^2
Ghaggar	11×10^4	4×10^4	Harbora	8×10^3	3×10^3
Varuna	11×10^4	79×10^3	Kim	75×10^2	43×10^2
Brahmani & Budhabalanga	92×10^3	35×10^3	Saryu	71×10^2	49×10^2
Kuakhai	92×10^3	54×10^3	Cauvery	62×10^2	340
Chambal	9×10^4	4×10^4	Kusei	54×10^2	23×10^2
Satluj & Jalangi	9×10^4	5×10^4	Dhous	5×10^3	17×10^2
Baitarni	54×10^3	24×10^3	Koshi	5×10^3	3×10^3
Daya & Dhenkanal	54×10^3	35×10^3	Manusmar	5×10^3	13×10^2
Sankha	54×10^3	24×10^3	Periyar	5×10^3	35×10^2
Mandakini	46×10^3	21×10^2	Sone	5×10^3	17×10^2

Subarnarekha	43×10^3	15×10^3	Thaliparamba	5×10^3	240
Aul	35×10^3	24×10^3	Uppala	5×10^3	4×10^3
Koel	35×10^3	17×10^3	Myntdu	35×10^2	28×10^2
Nagavalli	35×10^3	14×10^3			

5.1.2 Water Quality Trend

The water quality monitoring results obtained between 1995 to 2011 indicate that the organic and bacterial contamination are continued to be critical in water bodies. This is mainly due to discharge of domestic wastewater mostly in untreated from the urban centres of the country. The municipal corporations at large are not able to treat increasing load of municipal sewage flowing into water bodies without treatment. Secondly the receiving water bodies also do not have adequate water for dilution. Therefore, the oxygen demand and bacterial pollution is increasing day by day.

The water quality monitoring results were analysed with respect to indicator of oxygen consuming substances (Bio-chemical Oxygen Demand) and indicator of pathogenic bacteria (Total coliform and Faecal coliform). The result of such analysis shows that there is gradual degradation in water quality. The number of observations having BOD and Coliform density have increased between year 1995 to 2011. The water quality status for the period 1995 to 2011 in terms of number of observations having values of parameters in different ranges are given in figures 5.1 to 5.3.

Biochemical Oxygen Demand (BOD)

The numbers of observed BOD values less than 3 mg/l were between 57-69% during year 1995 to 2011. The maximum value of 69% was observed during year 2007. It was observed that there was a gradual decrease in number of observations having BOD < 3 mg/l.

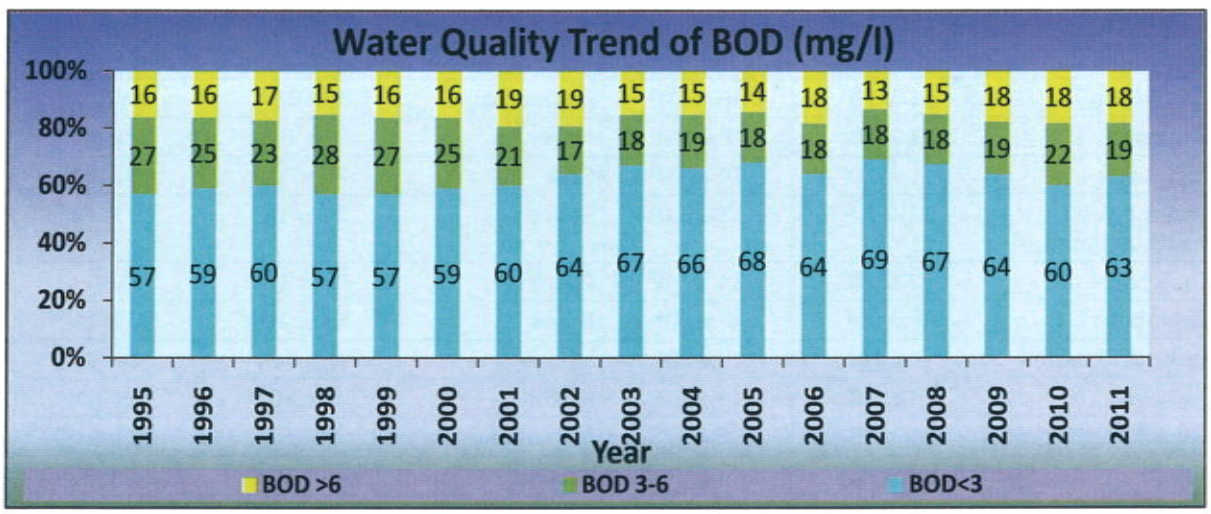


Figure 5.1: Water Quality Trend (BOD, mg/l)

The number of observed BOD value range 3-6 mg/l was between 17-28% during year 1995 to 2011, the maximum value of 28% was observed in the year 1998. It was observed that there was a gradual decrease in number of observations having BOD between 3-6 mg/l.

The numbers of observed BOD value> 6 mg/l were between 13 and 19% between year 1995-2011 and the maximum value of 19% was observed in the year 2001 and 2002. It was observed that there was a gradual decrease and in year 2011 the percentage observation was 18 % having BOD >6 mg/l.

Total Coliform (TC)

The numbers of observed TC values < 500 MPN/100 ml were between 44-63% during years 1995-2011. The highest percentage of observations was observed as 63% in year 1999, which decreased to 50% during year 2011.

The numbers of observed TC values ranges from 500-5000 MPN/100 ml were between 28-39% during year 1995-2011 the maximum value of 39% was observed in the year 2010.

The numbers of observed TC values > 5000 MPN/100 ml were between 9-24% during year 1995-2011. Minimum value of 9% was observed during the year 1999. The maximum value of 24% was observed in the year 2006. During the year 2011, it was observed as 14% indicating decreasing trend.

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

Faecal Coliform (FC)

The numbers of observed FC values <500 MPN/100 ml was between 48-70% during year 1995-2011. The maximum value of 70% was observed in the year 2009.

The numbers of observed FC values ranged from 500-5000 MPN/100 ml was between

20-35% during year 1995 to 2011. The maximum value of 35% was observed in the year 1999, which decreased to 21% in the year 2011.

The numbers of observed FC values > 5000 MPN/100 ml was between 7-21% during year 1995-2011. The maximum value of 21% was observed in the year 2006, which decreased to 10% in the year 2011.

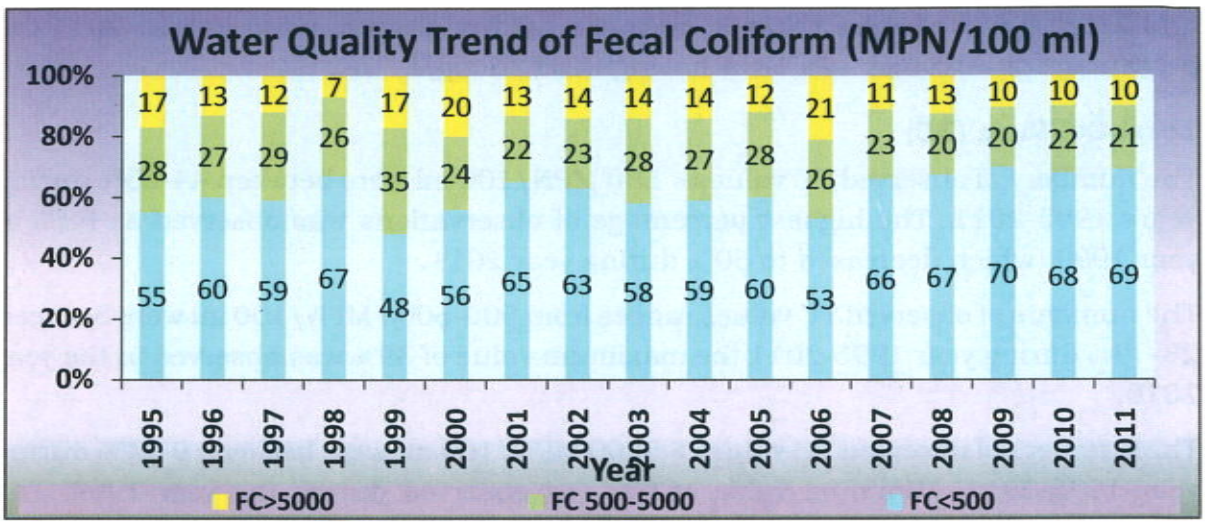


Figure 5.3: Water Quality Trend (Faecal Colliform, MPN/100 ml)

5.1.3 Water Quality status In Delhi stretch of Yamuna River

Delhi stretch of Yamuna River from Palla to downstream of Okhla barrage is regularly being monitored by Central Pollution Control Board at 4 locations on monthly basis. The river water quality trend in this stretch during the last five years (2008-2012) in terms of annual mean of four critical parameters i.e. Dissolved Oxygen (DO) Bio chemical Oxygen Demand (BOD) and Total Coliform (TC) and Faecal Coliform is depicted in Figures 5.4 – 5.7. The values of DO observed during the year 2012 reflects that the level of this parameter was well above the prescribed limit of 4.0 mg/l at Palla and ranged from 6.2 – 11.4 mg/l with annual mean of 7.7 mg/l. DO in the river depletes significantly after Wazirabad barrage and remain critical in the remaining part of the studied river stretch. No DO was observed in the river stretch from Wazirabad D/s to Okhla barrage D/s during the period January to July. Values of DO after wazirabad barrage varied from 0.0 – 5.4 annual mean ranged from 0.7 to 1.2 mg/l. Similar to DO, BOD also meets the prescribed standards of 3.0 mg/l at Palla. The level of BOD in this location varied from Below detection limit to 2 mg/l with annual mean of 2.0 mg/l. After Wazirabad barrage BOD always found violating the prescribed standards in the remaining part of the stretch with variation in values from 4 -113 mg/l and variation in annual mean from 26-56 mg/l. TC occasionally meets the standard of 5000 MPN/100 ml at Palla as the values ranged between 2200-3500000 MPN/100 ml. In rest of the river stretch TC always violates the standards

with significantly high counts. pH is the only parameter that meets the prescribed standards of 6.0 – 9.0 and 6.5 – 8.5 in the studied stretch of Yamuna River.

The reason of deterioration of Yamuna River water quality in delhi stretch especially after Wazirabad barrage is due to unabated discharges of wastewater into the river and no release of fresh water from Wazirabad barrage into the river especially during non monsoon period, which is essential to maintain self-purification capacity of the river.

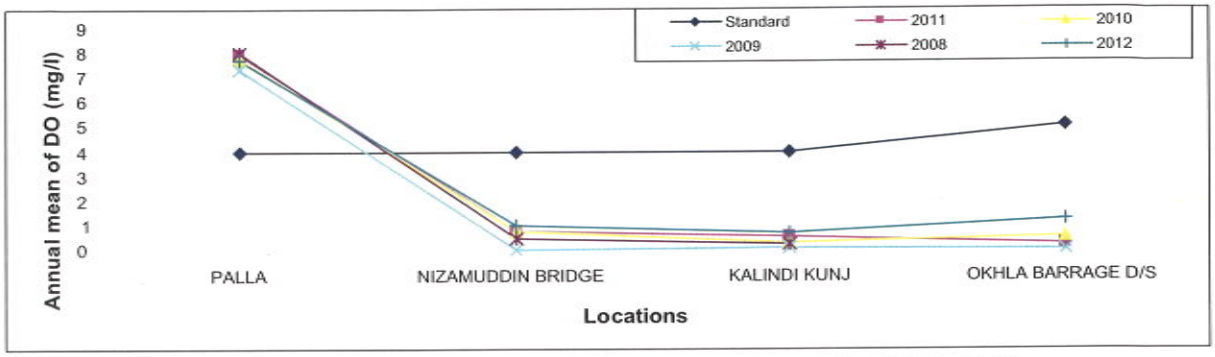


Figure 5.4: Dissolved Oxygen Profile of Delhi Stretch of Yamuna River (2008 – 2012)

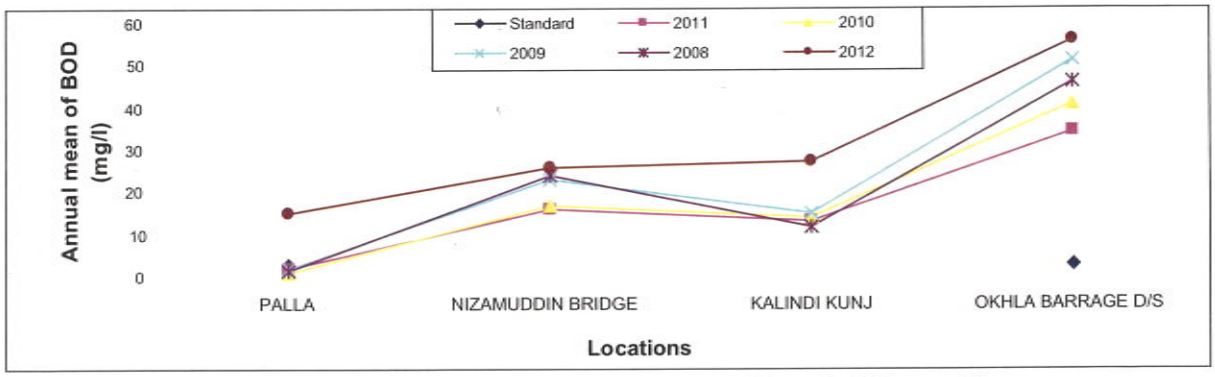


Figure 5.5: Bio Chemical Oxygen Demand Profile of Delhi Stretch of Yamuna River (2008 – 2012)

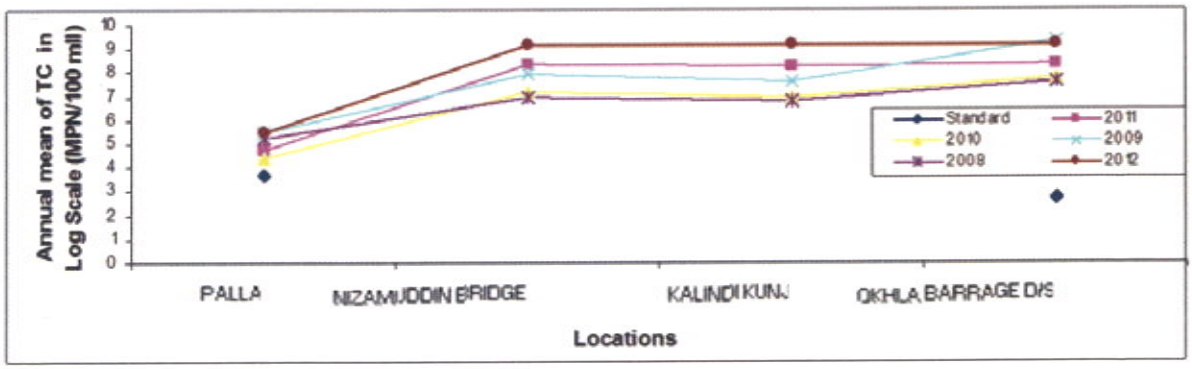


Figure 5.6: Total Coliform Profile of Delhi Stretch of Yamuna River (2008 – 2012)

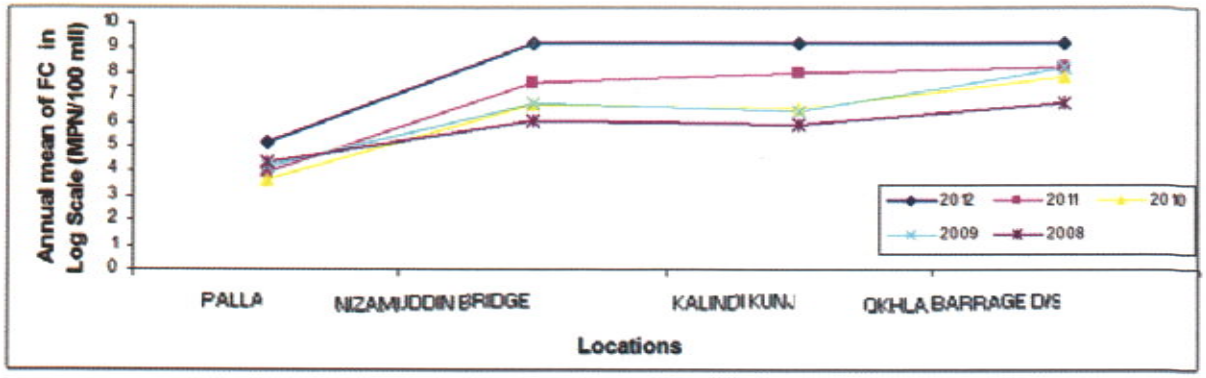


Figure 5.7: Faecal Coliform Profile of Delhi Stretch of Yamuna River (2008 – 2012)

5.1.4 STATEWISE GROUNDWATER QUALITY

The groundwater quality assessment in 23 States/UTs with respect to conductivity & nitrate and is summarised in Table-5.3.

Table 5.3: Statewise Groundwater Quality Ranges (Conductivity and Nitrate+Nitrite-N)

States/UTs	Conductivity (µmhos/cm)	Nitrate + Nitrite-N (mg/l)
Andhra Pradesh	211-6995	0.2-63.6
Assam, Meghalaya, Mizoram and Tripura	59-348	0.1-34.0
Chattisgarh & Madhya Pradesh	340-2182	0.0-8.5
Himachal Pradesh, Chandigarh and Punjab	226-1409	0.0-6.6
Kerala	54-891	0.1-7.6
Orissa	120-1396	0.5-11.8
Puducherry and Tamil Nadu	143-3417	0.05-9.4
Daman & Dadra Nagar Haveli	515-2506	0.3-5.1
Maharashtra	50-5670	0.1-23.5
Gujarat	546-12018	0.26-50
Rajasthan	685-21500	0.08-9.8
Uttar Pradesh and Uttarakhand	225-3163	0.0-34.5
Bihar	356-1015	0.0-0.07
West Bengal	123-8600	0.0-25.5

5.1.5 STATE SPECIFIC EXCEEDENCES OF CRITERIA PARAMETERS

The monitoring locations exceeding water quality criteria are worked out for each state by putting together all the monitoring locations on surface water. (Table 5.4).

Table 5.4: State/UT wise Percent violation of Parameters in Surface water

State	DO			pH			Conductivity			BOD			FC			TC		
	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	56	735	7.6	68	822	8.3	81	762	10.6	282	787	35.8	0	612	0	0	616	0
Assam	16	320	5	31	320	9.7	3	320	0.9	117	320	36.6	0	272	0	7	272	2.6
Bihar	2	212	0.9	13	213	6.1	0	206	0	9	213	4.2	79	212	37.3	72	212	34
Chandigarh	3	10	30	1	14	7.1	0	14	0	9	14	64.3						
Chhattisgarh	0	140	0	1	140	0.7	0	121	0	0	61	0	0	4	0	0	136	0
Daman, Diu, Dadra Nagar Haveli	2	24	8.3	3	24	12.5	6	23	26.1	10	10	100	0	1	0		1	0
Delhi	40	52	76.9	1	120	0.8	0	42	0	106	119	89.1	37	42	88.1	49	52	94.2
Goa	4	176	2.3	124	178	69.7	0	176	0	22	176	12.5	0	133	0	0	168	0
Gujarat	8	167	4.8	18	167	10.8	22	165	13.3	62	164	37.8	6	159	3.8	7	160	4.4
Haryana	7	75	9.3	3	74	4.1	1	75	1.3	25	70	35.7	18	29	62.1	20	29	69
Himachal Pradesh	14	652	2.1	27	656	4.1	0	656	0	25	652	3.8	2	544	0.4	2	577	0.3
Jammu & Kashmir	4	52	7.7	6	52	11.5	0	52	0	28	52	53.8						
Jharkhand	5	267	1.9	1	267	0.4	0	69	0	48	260	18.5	0	14	0	0	14	0
Karnataka	6	574	1	45	575	7.8	1	482	0.2	60	571	10.5	41	570	7.2	39	575	6.8
Kerala	48	447	10.7	32	447	7.2	43	446	9.6	36	447	8.1	16	447	3.6	14	447	3.1
Madhya Pradesh	5	311	1.6	11	325	3.4	8	304	2.6	79	300	26.3	0	145	0	0	177	0
Maharashtra	290	2175	13.3	154	2268	6.8	441	2263	19.5	1774	2267	78.3	0	2198	0	0	2198	0
Manipur	22	116	19	9	116	7.8	0	114	0	28	116	24.1	0	1	0	0	115	0
Meghalaya	0	93	0	12	93	12.9	0	93	0	47	93	50.5	14	93	15.1	0	93	0
Mizoram	0	36	0	0	36	0	0	36	0	0	36	0	0	36	0	0	36	0
Nagaland	16	32	50	0	32	0	0	32	0	3	32	9.4						
Orissa	9	921	1	1	923	0.1	88	914	9.6	141	924	15.3	228	924	24.7	260	924	28.1
Puducherry	1	10	10	3	10	30	3	10	30	0	3	0						
Punjab	7	140	5	0	140	0	0	139	0	61	138	44.2	50	134	37.3	55	139	39.6
Rajasthan	46	387	11.9	72	389	18.5	1	390	0.3	62	388	16	0	390	0	0	390	0
Sikkim	0	108	0	53	108	49.1	0	108	0	81	108	75	0	108	0	0	108	0
Tamil Nadu	26	593	4.4	35	617	5.7	34	615	5.5	85	618	13.8	48	618	7.8	50	618	8.1
Tripura	3	28	10.7	3	28	10.7	0	28	0	17	28	60.7	0	28	0	0	28	0
Uttar Pradesh	58	497	11.7	38	553	6.9	1	498	0.2	360	547	65.8	269	499	53.9	295	499	59.1
Uttarakhand	6	142	4.2	9	142	6.3	0	142	0	43	101	42.6	9	25	36	16	89	18
West Bengal	65	536	12.1	25	542	4.6	32	495	6.5	238	538	44.2	422	529	79.8	449	531	84.6

DO :Dissolved Oxygen; BOD = Bio Chemical Oxygen Demand FC : Falcal Coliform TC : Total Coliform.

5.1.6 Monitoring of major drains in NCT Delhi

Central Pollution Control Board is regularly monitoring major wastewater outfalls in NCT-Delhi on monthly basis. There are 22 major drains which are joining Yamuna River (18 Nos) and Agra/Gurgaon canals (4 Nos.). Two drains i.e. Najafgarh drain and Shahdara drain, which joins the river also receives waste water from neighboring State of Haryana and Uttar Pradesh respectively. Last ten years trend (2003 – 2012) of Bio-chemical Oxygen Demand load (BOD load) and discharge of these drains is depicted in Fig. 5.8. The collective annual average of these studied drains for the year 2012 in terms of discharge and Bio-chemical Oxygen Demand load was about 3800 MLD and 240 Tones/day (TPD) respectively. Out of total BOD load and discharge of the monitored drains, Yamuna River receives about 90 percent of both load and discharge. The study reveals that in the year 2012 there was a reduction of about 13 percent in discharge of the monitored drains as compared to year 2011, may be due to variation in the rate of rainfall city water supply, diversion of treated /untreated wastewater for irrigation etc. The BOD load also reflects decline of about 20 percent in the year 2012 as compared to the previous year may be either due to fluctuations in organic waste generation or variation in the efficiency of waste water collection, transportation and treatment system. As observed in previous years, the Najafgarh drain and Shahdara drains stood first and second both in terms of BOD load and discharge during year 2012. Out of the total BOD load and discharge of the studied 22 drains, these two drains namely the Najafarh drain and Shahdara drain alone contribute about 65 percent of BOD load and about 73 percent of total discharge, which is almost the same as observed during the year 2011.

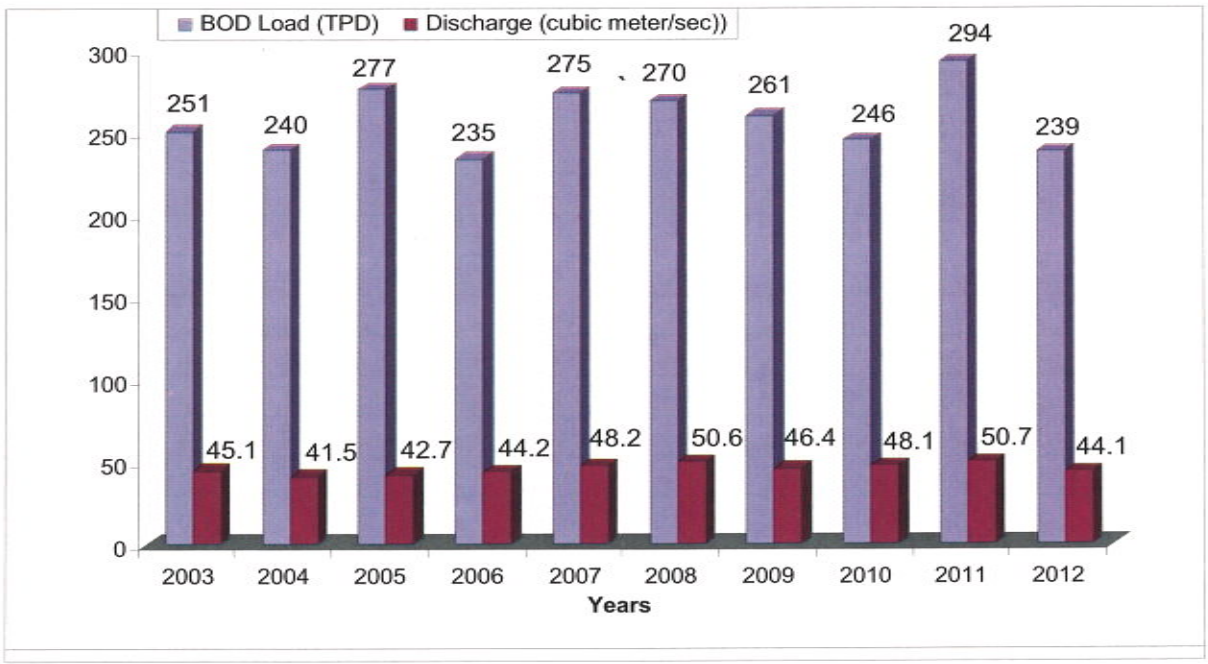
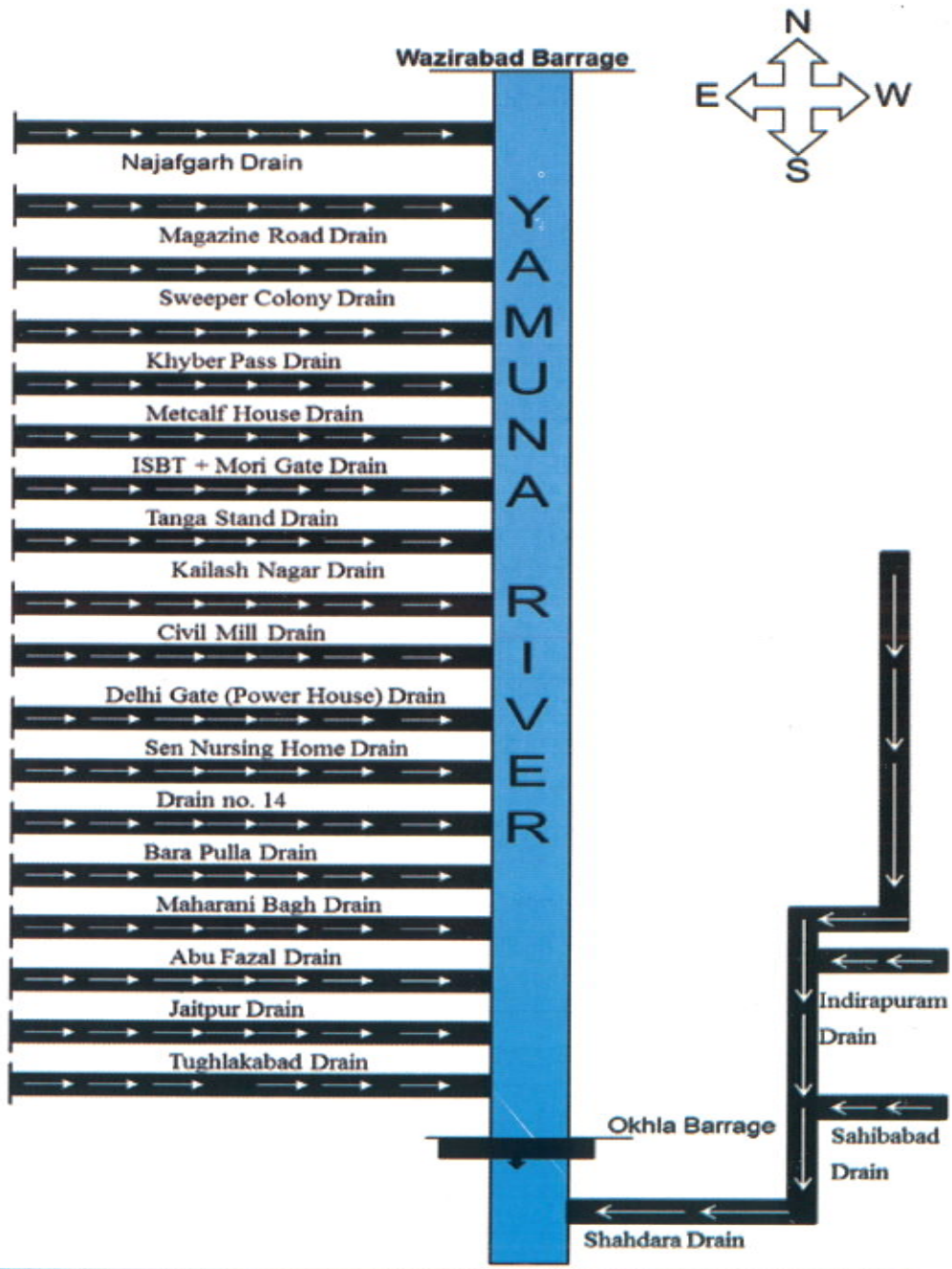


Figure 5.8 : Trend of BOD Load & Discharge Contributed by Major Drains At Delhi

5.1.6.1 SOURCES OF POLLUTION

(A) Wazirabad to Okhla Stretch (Drains Discharging in Yamuna)

River Yamuna in Delhi stretch from Wazirabad to Okhla receives wastewater from 18 drains. There are 8 drains discharging wastewater in Agra Canal. Schematic flow diagram of river Yamuna showing point sources is depicted in figure 5.9.



SCHEMATIC DIAGRAM OF POINT SOURCES OF POLLUTION IN YAMUNA RIVER

(B) Status of Sewage Treatment Plants

There are 17 Sewage treatment plants in Delhi with installed capacity of 2330 MLD whereas actual utilization is 1267 MLD due to inadequate conveyance system. The operation of these STPs is being maintained by Delhi Jal Board. Status of sewage treatment capacity developed so far and its utilization in respective treatment units is depicked in Table 5.5.

Table 5.5: Status of Sewage treatment capacity and its utilization

S. No.	Sewage Treatment Plant	Installed Capacity (MGD)	Present Utilization (MGD)
1.	Coronation Pillar Phase-I	10	19.95
	Coronation Pillar Phase-II	10+10	
	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
	Okhla Phase-II	12	
	Okhla Phase-III	37	
	Okhla Phase-IV	45	
	Okhla Phase-V	16 Total-140	
5.	Narela	10	2.6
6.	Najafgarh	5	0.2
7.	Nilothi	40	9.45
8.	Dr. Sen Nursing Home Nalla	2.2	2.53
9.	Delhi Gate Nalla	2.2	2.43
10.	Yamuna Vihar Phase-I	10	11.77
	Yamuna Vihar Phase-II	10 Total-20	
11.	PappanKalan	20	8.14
12.	Kondli Phase-I	10	45
	Kondli Phase-II	25	
	Kondli Phase-III	10 Total-45	
13.	Mehrauli	5	1.7
14.	Rohini	15	-
15.	Rithala (Old)	40	47.32
	Rithala (New)	40 Total-80	
16.	VasantKunj Phase-I	2	4.6
	VasantKunj Phase-II	3 Total-5	
17.	Ghitorni	5	-
	Total	**512.4 (2330 MLD)**	**278.43 (1267 MLD)**

Qualitative Analysis of STPs

CPCB has monitored 17 STPs during May, 2010 and August, 2011 and analysis results are mentioned in Table 5.6.

Table 5.6: Analysis results of STPs

S. No.	Sewage Treatment Plant	Installed Capacity (MGD)	Present Utilization (MGD)	Monitoring Period	Designed Parameters		BOD (mg/L)		COD (mg/l)		TSS (mg/l)	
					BOD (mg/l)	SS (mg/l)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
1.	Coronation Pillar Phase-III	10	17	May, 2010	20	30	87	9	301	58	437	26
				August, 2011			72	22	294	56	209	24
				November, 2012			411	35	1496	124	1902	70
	Coronation Pillar Phase-II	10+10		May, 2010	30	50	418	9	1592	58	722	28
				August, 2011			47	14	116	36	88	16
				November, 2012			143	6	460	13	420	34
	Coronation Pillar Phase-I*	10			30	50	-	-	-	-	-	-
	Total	40										
2.	Oxidation Ponds-Timarpur *	6	3				-	-	-	-	-	-
3.	Keshopur Phase-I *	12	50	May, 2010	10	10	-	-	-	-	-	-
				August, 2011			-	-	-	-	-	-
				November, 2012			200	27	596	115	738	47
	Keshopur Phase-II *	20		May, 2010	20	30	-	-	-	-	-	-
				August, 2011			-	-	-	-	-	-
				November, 2012			124	109	320	261	322	127
	Keshopur Phase-III *	40		May, 2010	20	30	-	-	-	-	-	-
				August, 2011			-	-	-	-	-	-
				November, 2012			223	84	489	267	29	124
	Total	72										
4.	Okhla Phase-I	30	132	May, 2010	30	50	147	47	464	172	491	73
				August, 2011			123	15	320	69	257	40
				November, 2012			-	-	420	158	247	38
	Okhla Phase-II	12		May, 2010	30	50	196	70	611	323	554	2
				August, 2011			123	27	320	85	257	53
				November, 2012					420	99	247	31
	Okhla Phase-III	37		May, 2010	30	50	196	36	611	114	554	69
				August, 2011			123	26	320	85	257	63
				November, 2012					420	152	247	56
	Okhla Phase-IV	45		May, 2010	30	50	112	33	381	119	272	58
				August, 2011			123	32	320	108	257	81
				November, 2012					420	143	247	52

S. No.	Sewage Treatment Plant	Installed Capacity (MGD)	Present Utilization (MGD)	Monitoring Period	Designed Parameters		BOD (mg/L)		COD (mg/l)		TSS (mg/l)	
					BOD (mg/l)	SS (mg/l)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
	Okhla Phase-V	16		May, 2010	20	30	115	24	521	115	332	63
				August, 2011			123	91	320	375	257	61
				November, 2012					420	87	247	23
	Okhla Phase-VI	30		May, 2010	10	10	-	-	-	-	-	-
				August, 2011			-	-	-	-	-	-
				November, 2012					449	87	320	25
	Total	170										
5.	Narela	10	2.6	May, 2010	20	30	51	12	154	51	204	23
				August, 2011			75	15	257	48	243	20
				November, 2012			117	7	397	34	398	17
6.	Najafgarh	5	0.2	May, 2010	20	30	115	7	401	51	304	25
				August, 2011			125	55	354	177	246	55
				November, 2012			121	26	360	92	192	34
7.	Nilothi	40	10	May, 2010	20	30	178	19	583	89	316	43
				August, 2011			152	7	361	42	176	19
				November, 2012			164	20	459	66	277	29
8.	Dr. Sen Nursing Home Nalla	2.2	2.2	May, 2010	30	50	306	3	925	13	969	6
				August, 2011			186	2	387	19	240	14
				November, 2012			495	3	1167	66	640	14
9.	Delhi Gate Nalla	2.2	2.2	May, 2010	30	50	106	4	446	14	248	24
				August, 2011			142	5	322	15	222	10
				November, 2012			315	4	944	27	280	20
10.	Yamuna Vihar Phase-I	10	12	May, 2010	30	50	134	8	319	57	221	47
				August, 2011			137	11	325	30	166	21
				November, 2012			242	16	508	47	263	39
	Yamuna Vihar Phase-II	10		May, 2010	20	30	92	8	407	71	301	60
				August, 2011			138	20	456	90	342	86
	Total	20		November, 2012			214	14	512	62	217	30
11.	Pappan Kalan	20	8	May, 2010	30	50	179	5	625	32	513	22
				August, 2011			143	22	424	81	199	53
				November, 2012			122	71	555	231	425	129
12.	Kondli Phase-I	10	50	May, 2010	30	50	219	28	466	71	286	91
				August, 2011			96	18	365	96	273	62
				November, 2012			56	31	160	130	68	50
	Kondli Phase-II	25		May, 2010	30	50	97	16	381	68	388	13
				August, 2011			90	51	247	155	274	141
				November, 2012			202	27	422	74	1075	114

S. No.	Sewage Treatment Plant	Installed Capacity (MGD)	Present Utilization (MGD)	Monitoring Period	Designed Parameters		BOD (mg/L)		COD (mg/l)		TSS (mg/l)	
					BOD (mg/l)	SS (mg/l)	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
	Kondli Phase-III	10		May, 2010	20	30	86	18	400	62	218	21
				August, 2011			90	17	247	64	274	82
				November, 2012			202	24	422	106	1075	63
	Total	45										
13.	Mehrauli	5	2	May, 2010	20	30	217	21	755	113	585	33
				August, 2011			-	-	-	-	-	-
				November, 2012			-	-	-	-	-	-
14.	Rohini	15	1		20	30	–	–	–	–	–	–
				November, 2012			–	–	–	–	–	–
15.	Rithala (Old)	40	47	May, 2010	30	50	110	11	426	42	250	29
				August, 2011			110	11	426	42	250	29
				November, 2012			143	6	392	27	307	17
	Rithala (New)	40		May, 2010	20	30	110	21		79		28
				August, 2011			110	21	426	79	250	28
				November, 2012			143	6	392	20	307	28
16.	Vasant Kunj Phase-I	2	4.5	May, 2010	30	50	156	42	542	166	494	100
				August, 2011			203	18	456	118	204	56
				November, 2012			153	29	567	59	441	32
	VasantKunj Phase-II	3		May, 2010	30	50	169	18	565	47	337	51
				August, 2011			159	25	427	78	285	25
				November, 2012			216	7	485	12	438	39
17.	Ghitorni	5	-		30	50	-	-	-	-	-	-

Note:
*** STPs were under augmentation**
- STP not in operation.

BOD : Biochemical Oxygen Demand
COD : Chemical Oxygen Demand
TSS : Total Suspended Solids

Data in Table 5.6 indicates that effluent from Three Sewage Treatment plants (viz. Okhla, Kondli and Najafgarh) does not meet the general discharge standard with respect to one or the other criteria pollutants.

5.1.7 Inter-laboratory comparison for Proficiency Testing in Bio-monitoring of surface waters in India.

Biological monitoring provides an effective, easy to understand, less time consuming and cost-effective method to determine cumulative impact of pollution in surface waters. Use of benthic macro-invertebrates for bio-monitoring is based upon community effects and the most frequent response of a community which is expressed in terms of Saprobic score and Diversity score for determination of biological water quality by using Biological Water Quality Criteria BWQC. Inter laboratory comparison for proficiency testing in bio-monitoring of surface water bodies is a part of NABL Accreditation and is being coordinated by Bio-science lab of CPCB, Delhi.

In association with State Pollution Control Board, Pollution Control Committees and concerned Zonal Offices of CPCB. In view of assessment for performance of each laboratory, a representative sample of benthic macro-invertebrates was collected from any one location of river/water body. Bio-assessment of water quality was performed by the concerned analyst using standard field protocol. The same preserved sample along with duly filled field protocol was re-assessed in Bio-science laboratory of CPCB, Delhi. The level of training and infrastructure required in each participating laboratory will be evaluated from the Score calculated through this exercise. Total 9 laboratories from various State Pollution Control Board, CPCB, Delhi and its Zonal Offices participated in the proficiency testing exercise. The outcome of the exercise is depicted in Table 5.7. To promote the effective implementation of methodology, an Hindi version of field protocol along with preliminary identification of benthic macro-invertebrates, has been communicated to various states where Hindi Rajbhasha is followed in routine scientific work. The Laboratory will further attempt to participate in the programme for further improvement.

Table 5.7 Inter laboratory comparison for Proficiency Testing on Bio-monitoring of water quality

S. No.	Laboratories	Date of Receiving sample	Water Body	Score
1.	Zonal Office–CPCB, Kolkatta	17.09.2012	River Ganga at Behrampur	Super excellent
2.	Regional laboratory, Davengiri, KSPCB	06.02.2013	River Tungbhadra at Honnali bridge	Excellent
3.	Zonal Office, Bhopal, CPCB	30.01.2013	River Narmada at Budhni ghat	Rejected
4.	Regional laboratory, Aurangabad, MSPCB	01.01.2013	River Godavari at Nathsagar, Jaikwadi Dam	Excellent
5.	Bio-lab, CPCB, Delhi	20.02.2013	River Yamuna at Palla, Delhi	Good
6.	Bio-lab, CPCB, Delhi	20.02.2013	River Yamuna at Nizamuddin, Delhi	Good
7.	Bhubaneswar, Orissa SPCB	18.02.2013	River Daya, distributary of Kuakhai	Excellent
8.	Lamphelpat, Manipur SPCB	25.02.2013	River Nambul at Heirongoithong	Excellent
9.	Shillong, Meghalaya SPCB	01.04.2013	River Rilang at Mawkyrwat	Excellent

- *Event: A- Scoring for sampling event details data entry in Field Protocol, B -*
- *Scoring for Sampling Location details data entry in Field Protocol, C - Scoring for Sampling Location details data entry in Field Protocol, D - Scoring for the Field measurements, and E - Scoring for Biological water quality assessment*
- *Score = (- ve) = Excellent, (0) Super Excellent, (0 – 1) Excellent, (1 – 2) Good, ≥ 2 Improvement required (Training), => 2 Rejected*

5.1.8 WATER QUALITY MONITORING UNDER NRCD PROJECT

Central Pollution Control Board Zonal Office (North), Lucknow is executing NRCD-funded project from Allahabad to Tarighat (Ghazipur), U.P. As per project terms of reference, monitoring in the designated stretch of river Ganga is being carried out for performance evaluation of Sewage Treatment Plants (STP) and evaluation of water quality of rivers in the stretch. Monitoring of STPs are undertaken once a month whereas, monitoring of rivers is carried out twice in a month for designated parameters.

5.1.8.1 Performance evaluation of Sewage Treatment Plants (STP)

STPs in Allahabad to Tarighat (Ghazipur) stretch

Name of STP	Place	Latitude/ Longitude	Type	Capacity (MLD)	Operating Agency	Date of Commissioning
Mirzapur	Mirzapur	N 25°08'42.6"/ E 082°35'17.8"	UASB	14	U.P. Jal Nigam	31.01.95
Allahabad	Allahabad	N 25°25'03.5"/ E 081°51'17.4"	ASP	60	U.P. Jal Nigam	June-July 1999
Bhagwanpur (BHU)	Varanasi	N 25°16'15.3"/ E 083°00'16.7"	ASP	08	U.P. Jal Nigam	31.01.90
Dinapur	Varanasi	N 25°20'43.2"/ E 083°02'47.2"	ASP	80	U.P. Jal Nigam	31.01.95
DLW	Varanasi	N 25°17'24.8"/ E 082°57'55.5"	ASP	12	DLW	31.01.89
Allahabad*	Allahabad	N- 25°27'26.3 E- 81°52'59.6"	FAB	29	U.P. Jal Nigam	January 2008

Monitoring of STPs comprise collection of four-hourly samples composited for twenty four hours. The samples are collected from inlet, outlet and other relevant sectors of all the STPs to evaluate sector-specific performance and overall efficiency of treatment. It has been observed that in most of the cases hydraulic capacity of the STPs is either under-utilized or excessively exhausted. Diluted characteristics of raw sewage, low in organics, received at STPs has also been a general observation. Performance of some of the STPs monitored during the year is summarized ahead:

STP : Allahabad (Capacity 60 MLD)

S. No.	Month	Flow (MLD)	BOD (mg/L)	TSS (mg/L)	COD (mg/L)
1	April 2012	47.14	77.5	75.2	90.9
2	May 2012	49.8	78.3	74.0	96.7
3	Jun 2012	50.9	84.9	83.0	88.8
4	July 2012	51.8	90.4	81.2	95.9
5	Aug 2012	42.9	86.1	86.0	94.4
6	Jan 2013	88.6	53.3	77.7	61.7
7	Feb 2013	69.0	84.5	87.2	78.1
8	Mar 2013	63.3	80.5	83.9	85.5

STP : Mirzapur (Capacity 14 MLD)

S. No.	Month	Flow (MLD)	BOD (mg/L)	TSS (mg/L)	COD (mg/L)
1	April 2012	14.72	90.8	92.0	92.1
2	May 2012	14.46	85.7	94.7	78.0
3	Jun 2012	18.34	83.2	87.0	72.0
4	July 2012	15.15	64.1	75.2	51.2
5	Aug 2012	18.71	67.8	92.4	74.4
6	Jan 2013	16.6	88.8	93.4	89.1
7	Feb 2013	19.32	83.3	88.5	81.3
8	Mar2013	18.415	86.0	93.4	82.2

STP : Dinapur, Varanasi

S. No.	Month	Flow (MLD)	BOD (mg/L)	TSS (mg/L)	COD (mg/L)
1	April 2012	78.58	77.5	86.3	78.2
2	May 2012	62.16	90.5	89.9	87.5
3	Jun 2012	58.14	87.3	92.7	89.3
4	July 2012	78.04	91.0	92.4	59.5
5	Aug 2012	59	84.9	91.8	87.5
6	Jan 2013	84.58	89.6	93.7	91.4
7	Feb 2013	98.12	89.1	90.3	93.5
8	Mar2013	107.69	90.5	93.2	89.5

STP: Bhagwanpur, Varanasi

S. No.	Month	Flow (MLD)	BOD (mg/L)	TSS (mg/L)	COD (mg/L)
1	April 2012	12.33	80.8	68.0	63.0
2	May 2012	11.07	48.8	58.8	57.3
3	Jun 2012	10.57	42.6	20.8	52.8
4	July 2012	11.26	84.3	83.5	93.7
5	Aug 2012	12.02	68.6	66.5	87.8
6	Jan 2013	9.95	5.8	22.2	-
7	Feb 2013	10.55	71.8	77.6	69.2
8	Mar2013	10.77	67.7	75.8	74.2

5.1.8.2 Water Quality of Rivers

Monitoring of water quality in river Ganga, Gomti, Varuna and their major tributaries is also being carried out under the project. Monitoring is undertaken twice in a month at following specific locations:

- River Ganga u/s Allahabad
- River Yamuna b/c with River Ganga
- Bathing Ghat at Sangam
- River Ganga d/s Allahabad ¼ width

- River Ganga d/s Allahabad ½ width
- River Tons b/c with River Ganga
- River Ganga at Pakka Ghat Vindhyachal
- River Ganga u/s Varanasi
- River Ganga at Dashashwamegh Ghat
- River Ganga near Malviya Bridge at Varanasi
- River Varuna b/c with River Ganga
- River Ganga d/s Varanasi ¼ width
- River Ganga d/s Varanasi ½ width
- River Gomti b/c with River Ganga
- River Ganga at Tarighat

With reference to designated best use classification (CPCB), the entire stretch of river. Ganga from Haridwar to Tarighat has been designated as conforming to category 'B', which implies that water quality should be fit for bathing, swimming, water contact sports etc. The status of water quality in different phases of monitoring is described below:

a. The Dissolved Oxygen (DO) 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' except in River Varuna where the DO concentration has been found below 5 mg/l. The River transform into drain to carry the excess effluent of Dinapur STP and few minor drains of Varanasi and meeting River Ganga in downstream of Varanasi.

b. Water quality of River Varuna is deteriorating every year due uncontrolled discharge of city waste and by-pass of Konia pumping station feeder to Dinapur STP. The river was tapped before the confluence with River Ganga however, low flow has been noticed in the river Varuna during Mahakumbh period.

c. In terms of Biochemical Oxygen Demand (BOD), the complete stretch does not conform to the 'B' class, especially in summer season wherein, the BOD limit of 3 mg/l typical of this class is generally observed to exceed.

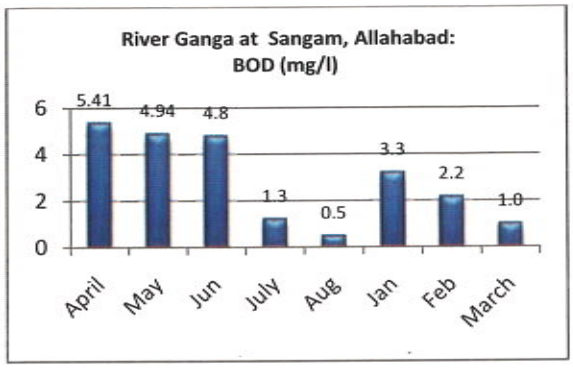
d. At all other locations water quality has been mainly affected by high concentration of coliforms due to uncontrolled discharge of sewage from different urban developments and poor performance of STPs operational in the catchment area.

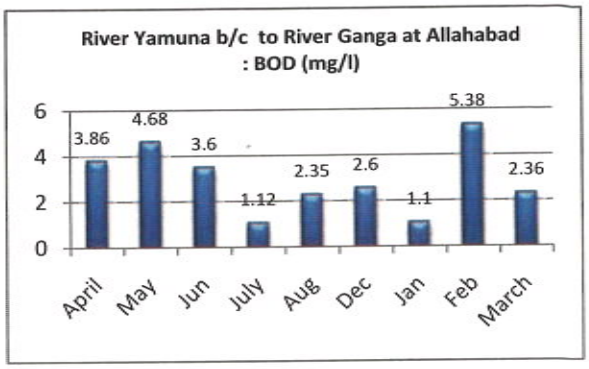
e. The poor water quality observed at Sangam in Allahabad and Dashashwamegh ghat (Varanasi), where high BOD (5 mg/l) has rendered the water unfit for bathing in summer season and occasionally during Mahakumbh mass bathing. The decreasing flow in river Ganga in summer season and increase in the input of organic load may be one of the potential reasons for increased BOD.

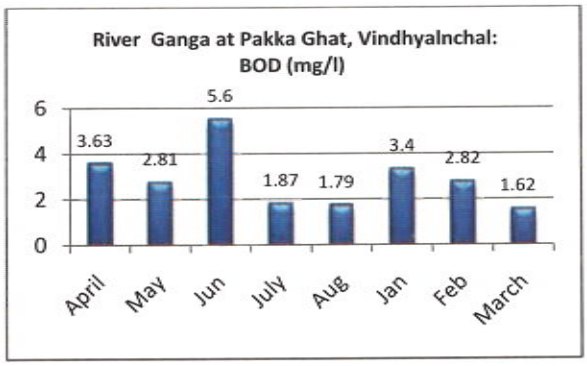
f. The BOD and Chloride concentration increases in summer and winter season and decreases in rainy season due to dilution in river.

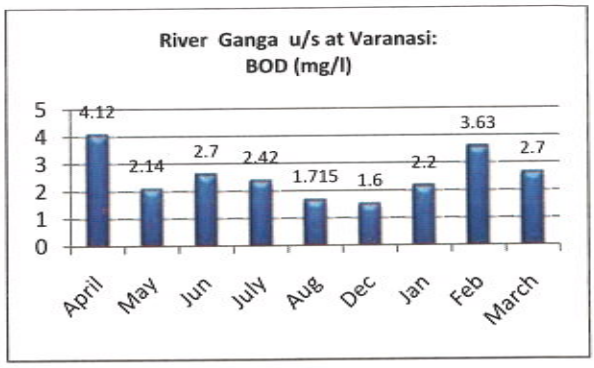
Concentrations of different parameters in river water are presented below:

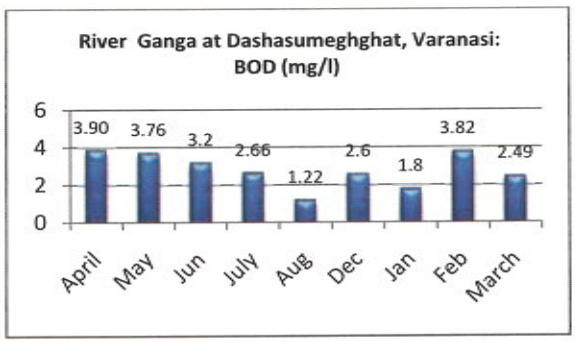
Biochemical oxygen Demand (BOD):

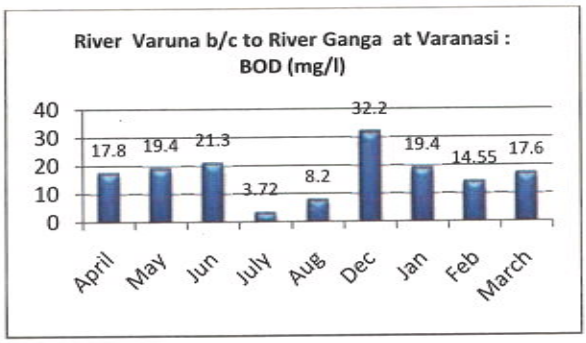


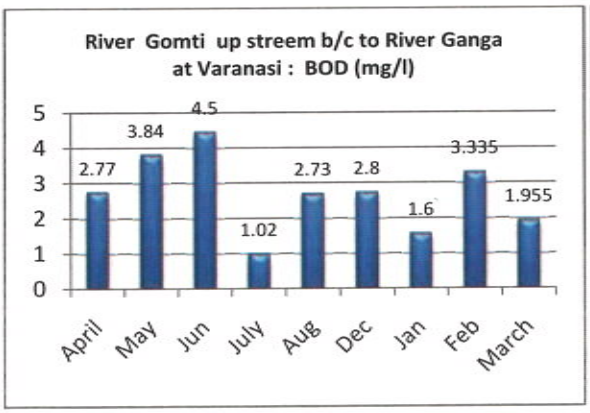


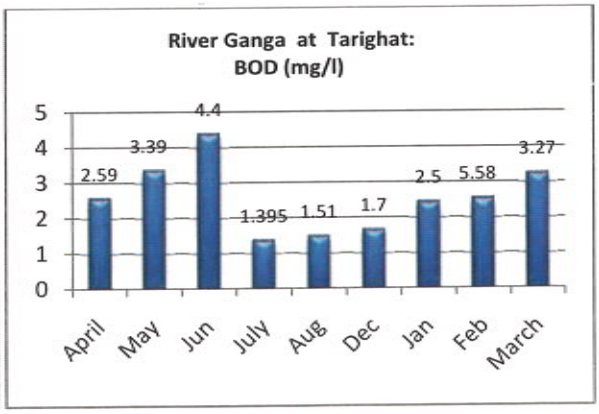




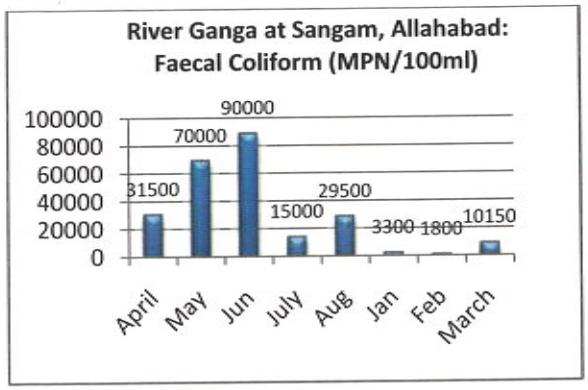


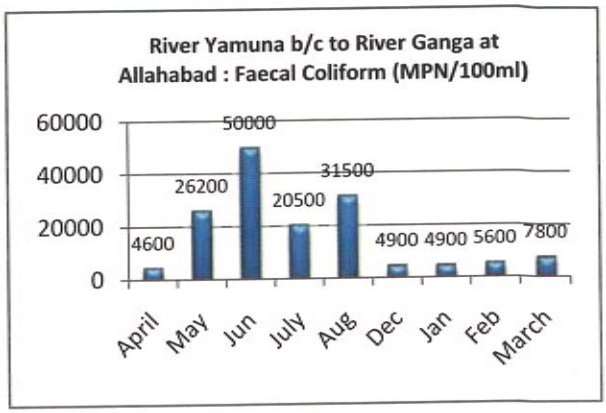






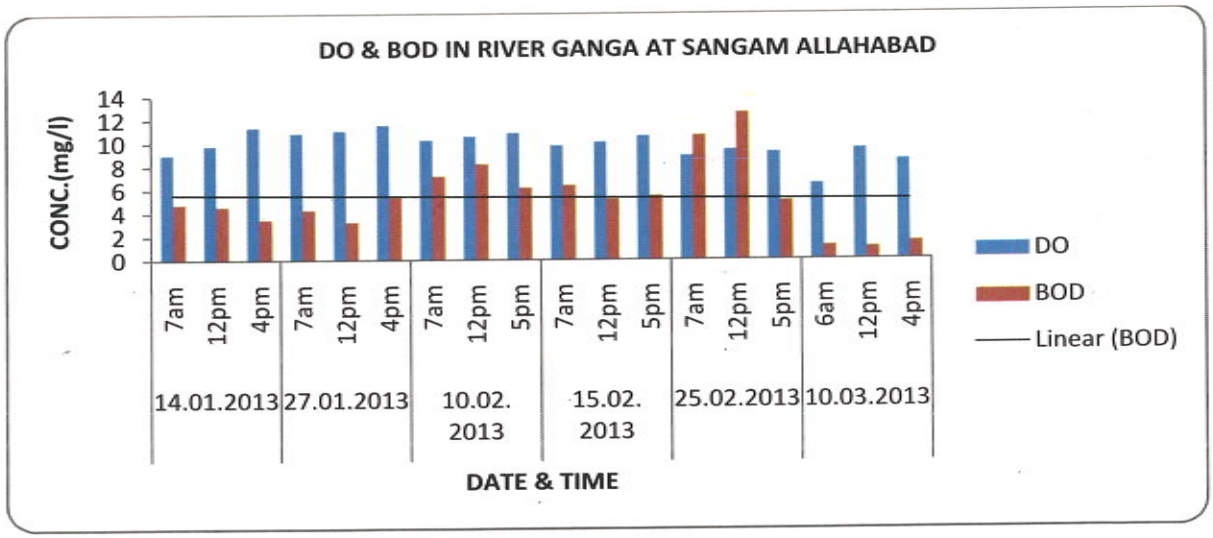
Feacal Coliforms



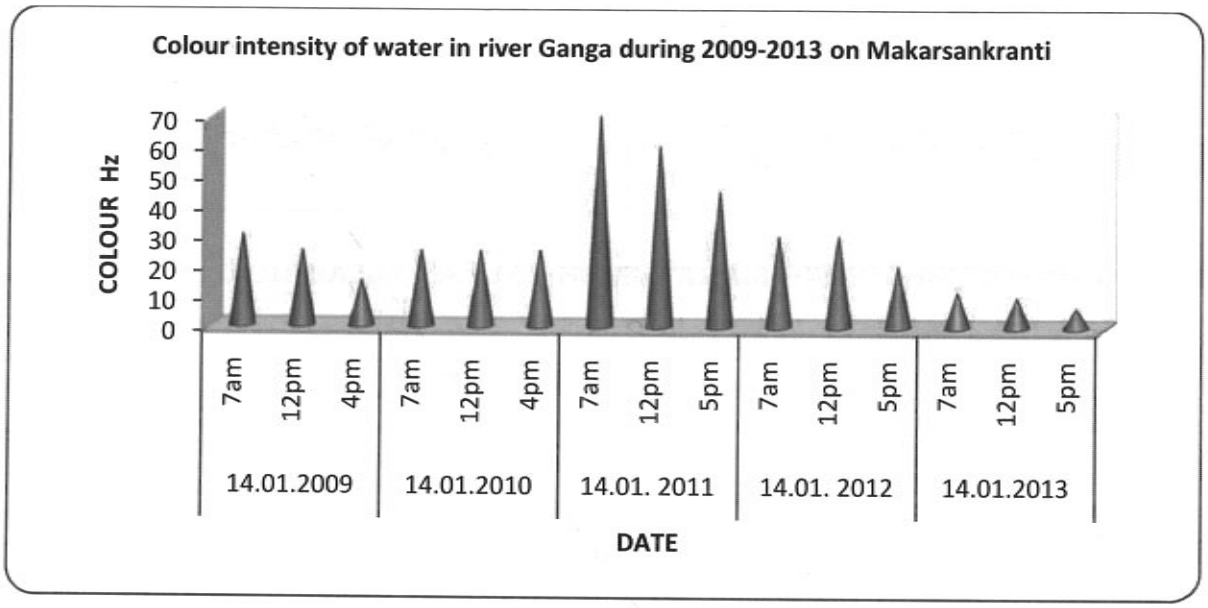


5.1.9 MONITORING DURING MAHAKUMBH 2013 AT ALLAHABAD

Mahakumbh Mela was held at Allahabad (Prayag) during January 14th to March 10th, 2013. During the Mela huge mass bathing activity took place. An estimated



130 million people visited the Mahakumbh Mela during the period spread over 55 days. Considering the importance of the occasion and to keep a constant vigil on status of water quality of rivers, CPCB Zonal Office, Lucknow conducted an intensive monitoring to assess the quality of river Ganga and Yamuna at 04 identified locations in Allahabad including Sangam during the Mela.



The water quality in river Ganga especially with respect to BOD and Color, registered improvement as compared to the status in the year 2009 and 2011. However, chloride concentration increased slightly. Observations with reference to water quality & quantity (flow) are summarized as under:

- Water quality of River Ganga observed at Sangam, Allahabad during the Mahakumbh improved with respect to color and BOD. It indicates the organic load on river Ganga has reduced, mainly due to measures taken by the local Government at different levels.
- Hon'ble High Court of Allahabad ordered for release of more than 2500 cusec water from Narora barrage to Ganga time to time during Mahakumbh. Hence, availability of consistent additional flow in the river has also been the other important factor for improved water quality
- Pre-emptive approach for enforcement followed by the CPCB and SPCBs in state of U.P. and Uttarakhand to restrict industrial discharge in to River Ganga through strict vigil over the industrial activities had also helped in qualitative improvement of water quality of the river.
- Before the Mahakumbh period all the distilleries and tanneries in upper reaches of the river Ganga were directed to either achieve zero discharge or restrict their operations to eliminate any chance of adverse impact on the river. The concerted action resulted in phenomenal reduction in pollution load on river.

5.1.10 MONITORING IN JAMMU & KASHMIR

A. Dal Lake, Srinagar

Monitoring of Dal Lake, Srinagar was undertaken in the month of June, 2012 for assessment of water quality. Observations are summarized as under:

Water temperature in the lake varies with respect to atmospheric temperature. The pH of water at all the sampling locations ranged between 7.1 to 7.8, the lowest pH i.e 7.1 recorded at intake point of STP Nishat Laam while the high i.e. 7.8 recorded at Nishat water. Maximum concentration of TSS (Total Suspended Solids) ie.123.4mg/l was recorded at Nishat Laam.

Location / Parameters	Hazratbal Boat (Tel Bel Nala)	Hazratbal Centre	Nishat Laam (Bod Dal)	House boat Shahbaaz (Nehru Park)
pH	7.4	7.6	7.6	7.8
Phosphate as P, (mg/l)	0.034	0.053	0.039	0.110
Chloride (mg/l)	7	7	7	9
NH_3-N (mg/l)	0.119	0.093	0.109	0.117
Dissolved Oxygen (mg/l)	7.2	8.6	8.5	6.2
BOD (mg/l)	3.25	0.6	1.1	3.45
COD (mg/l)	BDL	BDL	BDL	BDL

The lake receives sewage from different drains. Monitoring of different drain in lake catchments was carried out and their characterization is summarized as under:

Name of Drains / Parameters	Nallah Amir Khan	Bari-nam-bal	Telbal Nalla	Pish Pav Nalla	Meer-abshah Nalla	Shekh Nalla	Wat Kaul Nalla	Nalla Village Laam
pH	7.4	7.6	7.5	7.4	7.6	7.5	7.6	7.4
TSS (mg/l)	-	-	8.4	10.2	17.82	98.9	116.9	66
Phosphate as P, mg/l	0.154	0.32	0.113	0.169	0.169	0.361	0.138	0.69
Chloride (mg/l)	11	14	6	7	9	34	13	35
NH_3-N (mg/l)	0.095	0.358	0.121	0.101	0.117	1.558	0.104	1.688
Dissolved Oxygen,mg/l	-	-	8.6	2	4.8	-	-	5.0
BOD (mg/l)	-	-	2.6	2.6	6.32	37.2	-	9.24
COD (mg/l)	-	-	BDL	BDL	BDL	110	6	50

Based on observations the following recommendations are made:

- Dal Lake management plan may include control of deforestation, plantation of native species, control of erosion, dredging of sediments, removal of weeds, treatment of waste streams, interception and treatment of raw sewage reaching the lake.
- Collection & disposal of garbage & solid waste as per Municipal Solid Waste (Management and Handling) Rule, 2000.
- De-weeding operations (both mechanical and manual) need to be extended.

- Operations of dyeing (using hazardous chemicals & dyes) close to the Dal lake at Dhobighat (Hazratbal) is of grave concern as the hazardous pollutants are directly loaded in to the lake.
- More aerators may be installed in the lake especially at Khojiyarbal, Jogilanker Saidakadal areas, Barinambal Lagoon etc.
- Re-location of population within lake & re-alignment of the house-boats to provide proper drainage system so that there is no discharge of sewage directly into the lake.
- The efficiency of the existing STPs needs to be optimized.

Sewage Treatment Plants (STPs), Srinagar, (J&K)

Sewage from Srinagar City is the biggest source of pollution to water bodies including Dal lake. STPs at Nishat lam, STP Habak and STP Hazratbal located on the periphery of the Dal lake discharge treated water into the lake. Monitoring of STPs revealed following observations:

Detail of STPs

Detail	Hazratbal	Nishat	Habak
Year of Installation	2006	2006	2006
Designed capacity (MLD)	7.5	4.5	3.2
Actual flow (MLD)	4.09	2.3	2.3
Treatment Technology	Moving Bed Bio-reactor	Moving Bed Bio-reactor	Moving Bed Bio-reactor

Performance Evaluation

STP	Nishat		Hazratbal		Habak	
Parameters	**Inlet**	**Outlet**	**Inlet**	**Outlet**	**Inlet**	**Outlet**
pH	7.6	7.8	7.1	7.5	7.3	7.8
TSS (mg/l)	95	77.5	82.7	78.4		47.8
Phosphate as p, mg/l	1.106	0.675	0.906	0.780	2.92	0.869
Chloride (mg/l)	303	43	34	34	-	45
NH_3-N(mg/l)	1.996	1.822	1.706	1.698	2.29	2.920
BOD(mg/l)	47	5.34	35	22	100	3.42
COD(mg/l)	114	22	86	54	357	142

5.1.11 ACTIVITIES UNDER NATIONAL GANGA RIVER BASIN AUTHORITY (NGRBA)

Activities executed under NGRBA Project are summarized as under :

- Compliance verification of grossly polluting industries.
- Adequacy assessment of Common Effluent Treatment Plants.
- Performance evaluation of Sewage Treatment Plants.
- Intensive water Quality monitoring in polluted stretches
- Periodic pollution Assessment of major drains falling into River Ganga.

- Comprehensive groundwater Quality monitoring in adjacent districts of River Ganga.

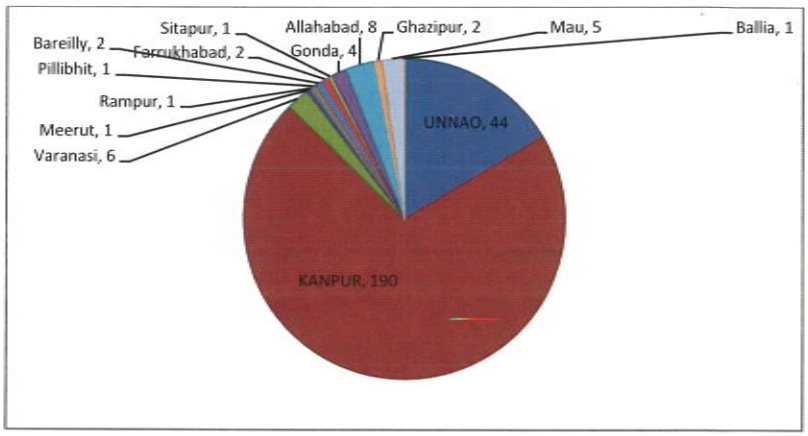
A summary of activities performed is as under :

5.1.11.1 Inspection of Industries

Compliance verification and Inventorisation of 268 industries was carried out in 14 districts of U.P., out of which 141 were found complying with the norms, while 114 were non-complying. Four industries were closed by own reason while 9 units were found not in operation. In order to evaluate performance of pollution control measures in-depth investigation of 230 tanneries and allied units in Unnao and Kanpur and 17 distilleries in different parts of the State was undertaken. Based on inspection reports, Directions u/s 5 of the E(P) A 1986 were issued for ensuring strict compliance. Observations of monitoring of tanneries are summarised as under:

a. Majority of Industries have not put up display boards with respect to name of the industry.

b. PETPs in majority of units were with inadequate capacity, poor maintenance and operation status commensurate with their actual production leading to overloading on recipient CETPs



c. Design of most of the clarifiers is faulty with respect to retention time and not appropriately synchronized with the pumping rate that leads to high TSS in the wastewater.

d. Majority of Industries do not have a valid consent from SPCB under Air (Prevention & Control) Act, 1981 and Water (Prevention & Control) Act, 1974, Authorisation from SPCB for handling of Hazardous Waste under the Hazardous Waste (Management and Handling & Trans-boundary Movement) Rules 2008.

e. Industries having individual Chrome Recovery Plants (CRP) have been noted with poor segregation of chrome liquor, operation of CRP and hence recovery of chromium resulting in release of high chrome bearing wastewater reaching CETP.

f. It has been noted that there has been lack of enforcement of notified standards for discharge of wastewater. Wastage of fresh water observed in most of the units in the process.

g. In majority of units either log Books for water consumption were not maintained or it was not matching with their current processing flowchart.

h. Majority of Industries have installed water meter at intake of water (Bore well) and at wastewater discharge point from primary effluent treatment plant but it was not properly working due to poor maintenance.

i. Measures for segregation of soak liquor and effective recovery of salt have not been initiated.

5.1.11.2 Performance evaluation of Common Effluent Treatment Plants (CETP)

Monitoring of CETPs operational at Kanpur, Unnao and Banthar (Unnao) was carried out during the year.

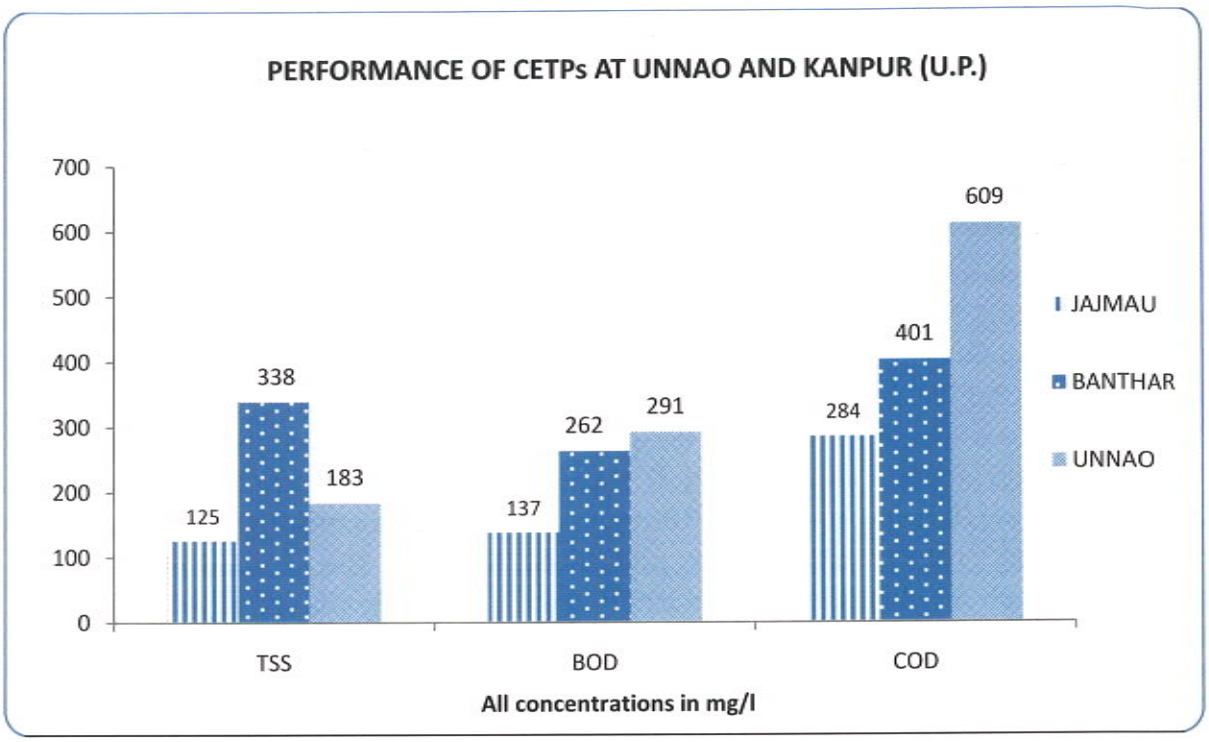
Salient Detail of the CETPs :

STP	Location	Latitude	Longitude	Technology	Capacity
STP-130 MLD Capacity, Jajmau.	Kanpur	N-260,25'04.2"	E-0800.25'05.1"	ASP	130 MLD
STP (5MLD), Jajmau.	Kanpur	N-260,25'01.7"	E-.0830.25'22.4"	UASB	5 MLD
CETP (36 MLD), Jajmau,	Kanpur	N-260,28'03.7"	E.-0800.25'17.1"	UASB	36 MLD
Common Chrome Recovery Unit (CCRU), Jajmau.	Kanpur	N-260,25'07.2"	E.-0830.25'17.0"	-	70 KLD (2 X 35)

Performance evaluation and observations :CETP Jajmau, Kanpur

- CETP is based on Up-flow Anaerobic Sludge Blanket System (UASB)
- CETP is getting higher concentration of the different pollutants at inlet than its designed capacity which makes the CETP ineffective to treat the wastewater generated by the industrial area. Proper collection system not yet laid down in the industrial area to collect the wastewater generated for treatment.
- Dried sludge evacuated from the sludge drying beds has been indiscriminately dumped on the low-lying area nearby the CETP.
- Pumping of the effluent from the different pumping stations should be synchronized to get optimum use of CETP.
- Laboratory within the premises of the CETP should be operational and regular chemical analysis of the samples should be carried out to have better control over the process of treatment.
- Common Chrome Recovery Plant, Jajmau, Kanpur
- The plant is underutilized, for want of spent chrome liquor from member tanneries and concomitant withdrawal of recovered chrome liquor in tanning operations.
- Overall treatment & recovery economics of the plant is adversely affected due to lack of co-ordination among tanners, municipal corporation and plant

management. There is a need and strict enforcement of a tripartite agreement among the three key stakeholders to ensure regular operation of the plant.



CETP Site-II, Industrial Area, Unnao

- The CETP is based on Activated Sludge Process (ASP).
- MG filter and Activated carbon filter are provided after the tertiary clarifier to remove the fine sand and colour of the treated waste respectively.
- Water flow meter installed at the final out let of the CETP.
- Unit has developed integrated phytoremediation system for removal of chromium from chromium contaminated waste.
- Bar screens are installed to remove the floating and suspended particles.
- Unit has 28 Nos. of Sludge drying beds and found maintained.
- Dry sludge is disposed to the captive TSDF at Banthar, Unnao.
- Housekeeping and Operation of different units of CETP is good.

CETP, Leather Technology Park, Banthar, Unnao

- The CETP is based on Activated Sludge Process.
- During the inspection 3 out of 9 of aerators in primary aeration tank were found non operational.
- Unit has installed MG filter and Activated carbon filter after the tertiary clarifier to remove the fine sand and colour of the treated waste respectively.
- Unit has 34 nos. of Sludge drying beds, which are maintained properly.

- Water flow meter and V-notch installed at the final out let of the CETP.
- Housekeeping and Operation of different units of CETP was good.
- High concentration of Chromium (30.8 mg/l) in raw effluent implies ineffective chrome recovery through primary treatment by member units of CETP.
- High TDS (10911 mg/l) in treated effluent implies improper waste management practices by individual member units.

5.1.11.3 Monitoring of groundwater quality

Groundwater monitoring at 196 locations in 19 districts of U.P. was carried-out during reporting year 2012-13 was observed that the overall groundwater quality was not satisfactory with respect to colour, turbidity, total hardness, calcium, magnesium, sulphide, chloride, fluoride, sulphate. Almost 15 districts were identified where the value of these parameters exceeded the prescribed norms (standard of IS: 10500). The parameters i.e. colour (10 Hazen), turbidity (Unnao-44.5 NTU), TDS (Unnao-4032 mg/l), total hardness (Unnao-2055 mg/l), calcium (Unnao-461mg/l), magnesium (303 mg/l) exceeded the prescribed limits in the studied area. Other parameters such as chloride (Unnao-1993.4 mg/l), fluoride (Raibarelly-5.78 mg/l), and sulphate (Ghazipur-275 mg/l) were also found, not complying with the drinking water quality norms.

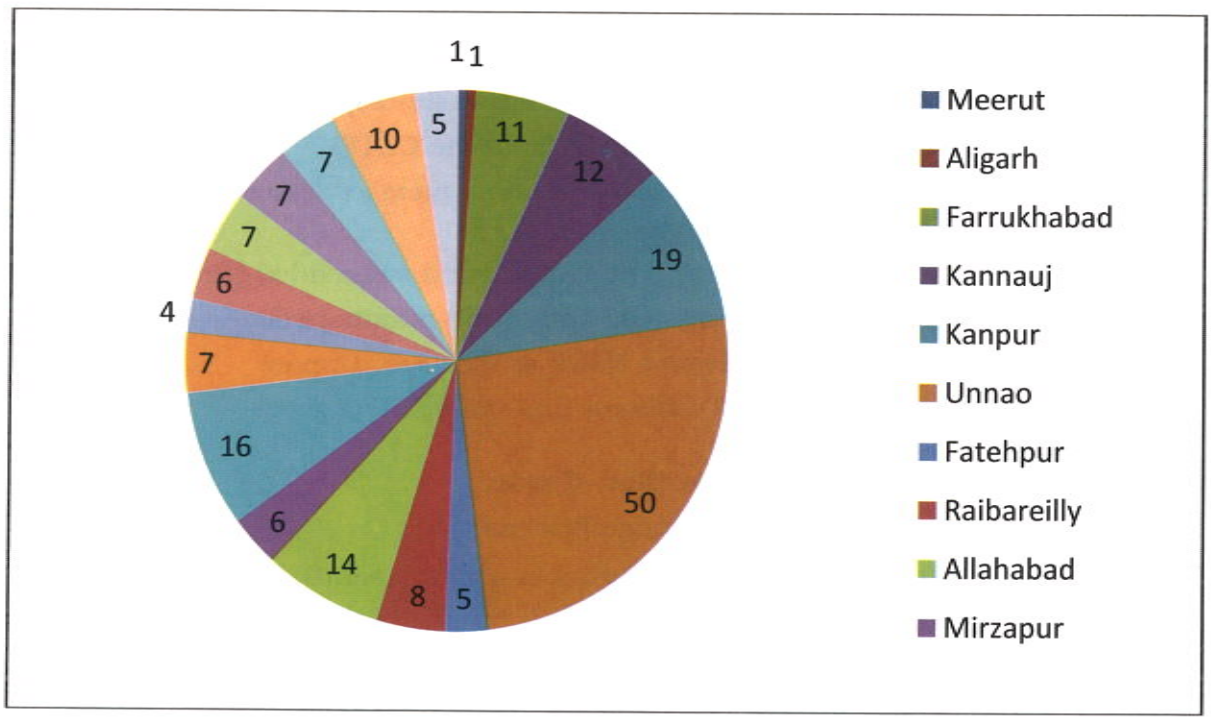
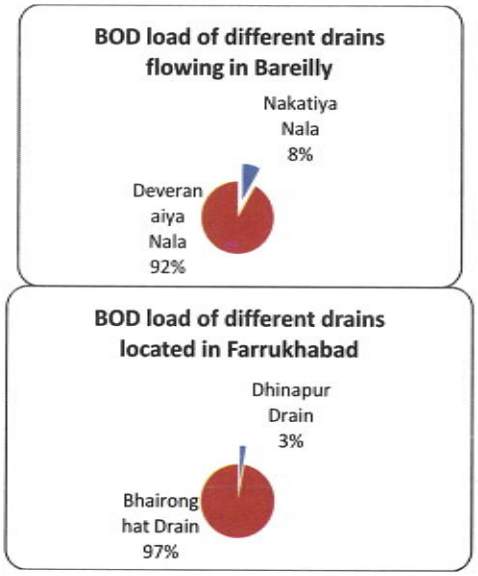
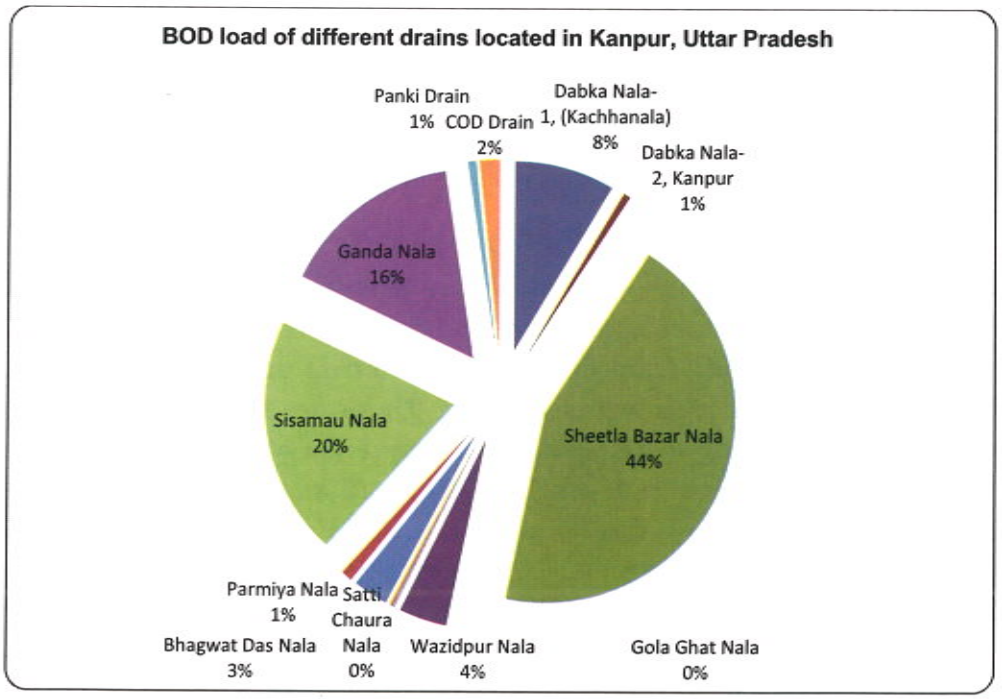


Figure 5.9: Groundwater monitoring in different districts of U.P.

5.1.11.4 Drain Monitoring and assessment of pollution load

Total 52 drains were monitored under NGRBA Project in 13 districts of U.P. Waste water discharge from different drains in the studied zone revealed significant variation in quality and quantity. The parameters which exceed the prescribed limits in most of the districts were SS, BOD and COD. Other parameters, i.e. Ammonical Nitrogen, Phosphate were also exceeded in few districts. Pollution load was also assessed in the drains monitored. Some of the cities with load assessment are presented below:





5.1.12 MONITORING OF RIVER GANGA FROM BUXAR TO SAGAR UNDER NGRBA

Over the past century, city population along the banks of River Ganga has grown at a tremendous rate, while waste control infrastructure and management has remained relatively unchanged resulting increase of pollution of Aquatic system. The reconnaissance survey on the riparian land of River Ganga from Buxar to Sagar was undertaken under NGRBA project.

Detail survey of the different components like drains, ground water, surface water and industries located on the bank of the river was given the importance. Details of the analysis result indicates that five major drains in Bihar and ten major drains in West Bengal has a flow, ranged from 0.29 MLD to 107 MLD and 47 MLD to 30143 MLD respectively. pH of the analysed sample reveals neutral to alkaline pH (7.00-7.68).

Results of ground water in different districts of Bihar reveals that Alkalinity, Hardness and TDS is being violated BIS Drinking Water Standard the Alkalinity recorded between are 268 mg/l to 572 mg/l while hardness between 304 mg/l to 760 mg/l and TDS varied between 637 mg/l to 1284 mg/l at some Monitoring locations stations respectively.

In case of West Bengal, status of ground water in terms of Bacterial contamination has been highly alarming. The same trend was observed in Bihar also. Status of surface water in Bihar and West Bengal has been found affected by high concentration of coliform which is limiting the whole stretch to "Class-C" with reference to designated best use classification of CPCB. DO of surface water is generally more than 5 mg/l which is well within the limit of "Class A".

Fifteen industries located on the banks of River Ganga were monitored and the results showed that the effluents of most of the industries met the standards given by CPCB in terms of BOD.

5.1.13 SURVEILLANCE OF NATIONAL WATER QUALITY MONITORING PROGRAMME (NWMP) STATIONS IN GUJARAT AND MAHARASHTRA

The monitoring stations were selected and finalized on the basis of pollution load received by the receiving body from domestic, industrial and any other man made activities, which affects the river water quality. There are total 113 Water Quality Monitoring stations operating in Gujarat with frequency of monitoring as monthly (36Nos.), quarterly (35Nos.), and half yearly (42Nos.). All the water quality monitoring at the stations are carried by Gujarat Pollution Control Board. In Maharashtra state, 73 Water Quality Monitoring stations are operational on monthly (24Nos.), quarterly (24Nos.) and half yearly (25Nos.) basis. The Zonal Office has visited total 24 stations in Maharashtra and Gujarat. The main objective of visit was to ascertain the sampling

and analytical procedure followed by the State Pollution Control Boards (SPCBs). It is observed that the samples were collected as per the guidelines of Central Pollution Control Board during the monitoring. For river water quality monitoring, the State Pollution Control Boards are collecting the samples either from the mid-stream or near the bank of the river at about half meter depth. In Gujarat, the Bio-Monitoring is also carried out once in a quarter by all Regional Offices of Gujarat Pollution Control Board. The collected water samples are analysed at the Regional as well as Central laboratories of SPCBs.

5.1.14 INTER – STATE RIVER WATER QUALITY MONITORING

5.1.14.1 NORTHERN ZONE

Monitoring of river Sutlaj, Beas, Sone, Betwa, Ramganga, and Ganga is being carried out on quarterly basis at the Inter-State boundary of Himachal Pradesh, Punjab, U.P., M.P. and Bihar. Water samples are collected from the identified river points and analyzed for selected parameters as per the monitoring protocol notified by the MoEF, New Delhi. Details of locations and monitoring frequency are appended below:

S. No.	River/Drain	Latitude/ Longitude	Sampling Location	Frequency	Remark on water quality
1.	Ganga	N 25°35'14.0"/ E 083°36'19.3"	Tarighat, Ghazipur (U.P.)	Quarterly	*Quality Class 'C'
2.	Betwa	N 24°23'57.5"/ E 78°10'41.4"	Kanjia Bridge, (12 km from Mongoli Vill towards M.P)	-do-	-do-
3.	Betwa	N 25°11'33.4"/ E 78°32'32.3"	D/S Dukana Dam near Talbehat U.P.	-do-	-do-
4.	Sone	N 31°56'50.1"/ E 075°53'33.6"	Chopan Village (U.P.)	-do-	-do-
5.	Sone	N31°56'50.1"/ E075°53'33.6"	Rehand Dam, Deora (M.P.)	-do-	-do-
6.	Sutlej	N 31°22'34.2"/ E 076°21'52.7"	Nangal (Punjab)	-do-	-do-
7.	Sutlej	N 31°08'42.6"/ E 082°05'17.8"	Olinda (H.P)	-do-	Quality Class 'A 'except Coliforms
8.	Drain	N 31°23'57.0"/ E 76°23'47.9"	Golthai drain (H.P.)	-do-	-do-
9.	Drain	N31°56'05.3"/ E075°54'59.4"	Sohana Drain (Punjab)	-do-	-do-
10.	Beas	N31°56'49.8"/ E75°53'33.5"	Babe Ki Kuttiya at Talwada (Punjab)	-do-	Quality Class 'A' except Coliforms
11.	Beas	N31°57'54.4"/ E075°54'37.9"	H.P. (Shah Barrage towards Pong dam)	-do-	Quality Class 'C'

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

5.1.14.2 WESTERN ZONE

In Western Zone, (Maharashtra and Gujarat) there are twelve River Water Quality Monitoring stations finalized on various rivers at the Inter-state boundaries of Gujarat, Maharashtra, Rajasthan, Madhya Pradesh and UT of Daman etc. The Central Pollution Control Board, Zonal Office has been carrying out monitoring once in a year. The main objective of the monitoring is to assess the river water quality at inter-state boundaries of UT of Daman, Gujarat and Maharashtra states. The water samples have been analysed for various physico-chemical parameters; biological parameters with a view to assess the water quality of the river at interstate boundaries.

Details of identified locations at interstate boundaries (after rationalization):

S.No.	River	Sampling Locations
1	Mahi	Rajasthan - Gujarat Border, Kadana dam
2	Narmada	Navagam – Near Kevadia, MP Border
3	Sabarmati	Rajasthan – Gujarat Border, Kheroj bridge, Khedbrahma
4	Tapi	Madhya Pradesh – Maharashtra Border, Ajnad
5	Tapi	Maharashtra – Gujarat Border, Prakasha
6	Tapi	Maharashtra and Gujarat border at Nizhar
7	Bhima	Maharashtra – Karnataka border, Takli
8	Krishna	Maharashtra – Karnataka border, Kurundwad
9	Godawari	Maharshtra – Andhra –Karnataka border, Dharmadabad
10	Wainganga	Chattisgadh – MP – Maharashtra border, Bapera village
11	Damanganga	DNH – Gujarat border (U/S of CETP Vapi outlet)
12	Damanganga	Gujarat – Daman border, near Jari causeway.

Analysis results are depicted in following Table.

Interstate River Water Quality Monitoring During Year 2012-2013

Location & Sampling Date	Parameters																		
	pH	Cond.	TSS	TDS	DO	COD	BOD	T.Hard	Ca^{+2}	Mg^{+2}	NH_3-N	NO_3-N	NO_2-N	PO_4-P	F^-	Cl^-	SO_4^{-2}	Na^+	K^+
River Sabarmati at Kheroj Bridge, Sabarkantha, Guj. 13.08.2012	7.18	456	16	266	8.1	4.1	1.2	121	29.4	11.6	0.17	BDL	0.013	0.006	0.42	38.5	20.0	36.7	3.8
River Mahi at Kadana Dam, Guj. 23.08.2012	6.78	265	25	192	5.9	6.7	0.93	76.2	23.3	4.4	0.11	1.38	BDL	0.049	0.066	14.8	20.2	16.2	1.7
River Narmada at Navagam 23.08.2012	6.71	178	55	136	7.6	21.0	3.5	72.5	22.8	3.8	0.13	1.24	BDL	0.05	0.04	5.2	9.3	10.7	1.5
River Wainganga at Bapera, Bhandara 30.08.2012	7.57	150	84	124	6.4	34	0.92	48.6	19.6	7.1	0.132	0.74	0.004	0.038	0.19	1.13	6.55	7.2	2.1
River Tapi at Ajnad 19.12.2012	8.18	545	20	413	11.0	16.0	3.40	162	28.8	21.87	1.15	BDL	BDL	BDL	BDL	22.6	24.2	29.6	2.9
River Tapi at Prakasha 20.12.2012	8.46	386	13.5	223	9.0	6.36	5.71	118	26.4	12.64	0.16	BDL	BDL	BDL	BDL	19.2	28.7	19.4	3.8
River Tapi at Nizhar 20.12.2012	7.95	328	7.4	180	5.6	30.3	2.41	128	29.6	13.12	1.02	BDL	BDL	BDL	BDL	12.0	17.9	33.1	2.7
River Bhima at Takli, Solapur 07.03.2011	7.39	1593	26	844	7.1	31.2	3.4	388	107	30	0.20	BDL	0.05	0.018	0.27	151	196	115	7.0
River Krishna at Kurundwad, Kolhapur 07.03.2011	7.65	457	10	231	6.7	14.4	1.3	170	40.7	16.6	0.30	BDL	0.015	0.032	BDL	31	87	38.3	2.3
River Godavari at Belur,Dharmadabad 07.03.2011	7.95	649	75	352	--	17	2.4	180	66.1	3.7	0.77	0.17	0.001	0.27	0.285	32.9	67.2	47.8	3.0

Note: All results are expressed in mg/L Except pH, Turbidity (in NTU) & conductivity (in µmho/cm)

5.1.14.3 EASTERN ZONE

Central Pollution Control Board in Eastern Zone monitored the river water quality at interstate boundaries at 8 selected stations in five rivers viz. River Churni, Damodar, Subarnarekha, Indravati and Mahanadi. All the Five Rivers are, in many ways the State's best known and most important river system. These are the main sources of water for millions of people and supports many recreational and Commercial activities to the communities along the river side. The objectives of monitoring are:

- Characterization and indentifying changes or trends in water quality over time
- Identifying any specific, existing or emerging water quality problems
- Determining potential impacts if any on the water quality of Interstate streams

Three rounds of monitoring has been under taken during Summer, post-monsoon & Winter in the Year 2012 – 2013 at eight different selected stations of the five rivers.

The analysis results pertaining to the water quality of all eight stations at aforementioned five Rivers are presented in Table 5.10 and Table 5.11.

The analysis results pertaining to the collected samples shown similar trends in case of parameters like pH, Dissolve Oxygen (DO), Bio Chemical Oxygen Demand (BOD), the pH value ranged from 6.1 – 8.2 and well within the acceptable limit of bathing water criteria. DO, BOD value ranged from BDL to 8.5 mg/l and BDL to 31 mg/l respectively. The BOD is one of the most important parameter in stream pollution control activities and as per BIS recommendation it should not be more than 3.0 mg/l for out-door bathing in river but the very low DO and very high BOD value observed only in Churni river throughout the Year irrespective of any season and ranged from 7.5 – 31.0 mg/l. Except Churni river the values of all other four rivers are within the acceptable limit. The TKN value ranged from BDL to 4 mg/l respectively. But in Churni River it shows high value and remains positive in all season. The Total and Faecal Coliform count is more and above permissible limit in all the season in all the river and there had been no particular trend. The reasons may be untreated sewage, mass bathing, open defecation and Cattle bathing.

Churni river at Bijoypur

By and large, it can be concluded that except Churni river there is no sudden abrupt changes or deviation from the normal acceptable ranges but the water quality of the rivers remains bacteriologically polluted throughout the year. All the river water may be utilized

5.2 NATIONAL AMBIENT AIR QUALITY MONITORING PROGRAMME

Central Pollution Control Board is executing a nation-wide National Air Quality Monitoring Programme (NAMP). NAMP was started in 1984 with 7 stations in Agra and Anpara. The growth of operating Ambient Air Quality Monitoring Stations in the country is given in figure below. The ambient air quality monitoring network has 545 operating stations covering 225 cities/towns in 26 States and 5 Union Territories as on 31st March 2013.

5.2.1 Air Quality Monitoring Stations in Metropolitan Cities

In the 53 metropolitan cities (population ≥ 10 lacs; Census 2011), the air quality with respect to mainly three criteria air pollutants such as SO2, NO2 and PM10 are discussed and presented. There are 205 air quality monitoring stations in 53 metropolitan cities (as on 31.12.2012).

The analysis of air quality in metropolitan cities during 2012 reveals that with respect to SO2 all the cities are in the low category except Jamshedpur, Dhanbad, Pune and Ghaziabad (which falls in moderate category) and within the prescribed standard (Figure 5.10).

As for NO2, in ambient air during 2012, 11 cities have been are in the low category, 31 cities in moderate category while 42 cities comply with the air quality standard. Cities falling under high category have been Asansol, Jamshedpur, Raipur, Pune, Meerut, Kolkatta and Jaipur (7 cities) and in critical categories Delhi thus air quality of 8 cities have been exceeding the National air quality (fig. 5.12) standard with respect to PM10 in ambitent air no city falls under low category, 6 cities have been in moderate category, 6 cities (Chennai, Kollam, Kozhikode, Madurai, Mallappuram, Thiruvananthapuram. The air quality in 11 cities falls in high category, 33 in critical category while 44 cities exceed the standard.

With respect to PM10, 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 exceed the standard with respect to PM10 (Figure 5.12).

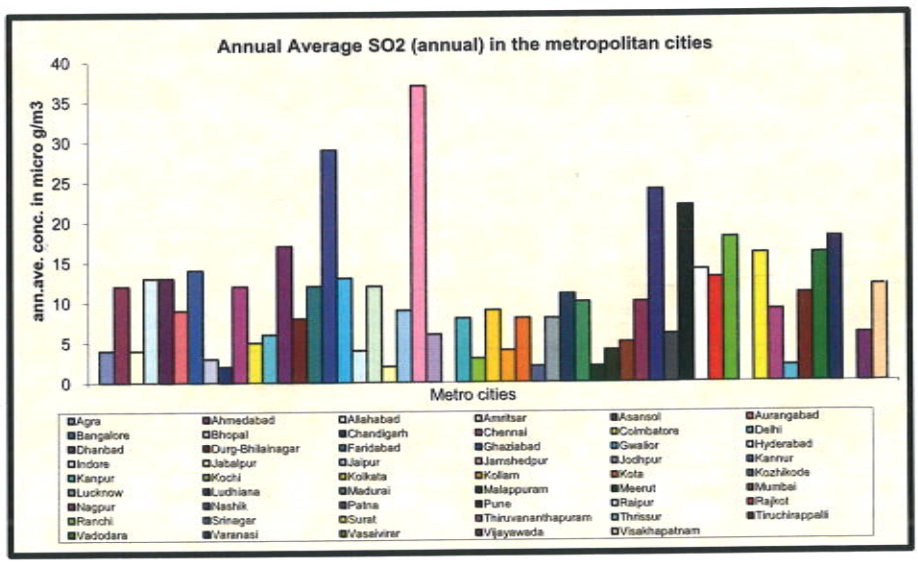


Figure 5.10 Ambient air quality with reference to Annual Average SO_2 Conc. in the metropolitan cities during year 2012

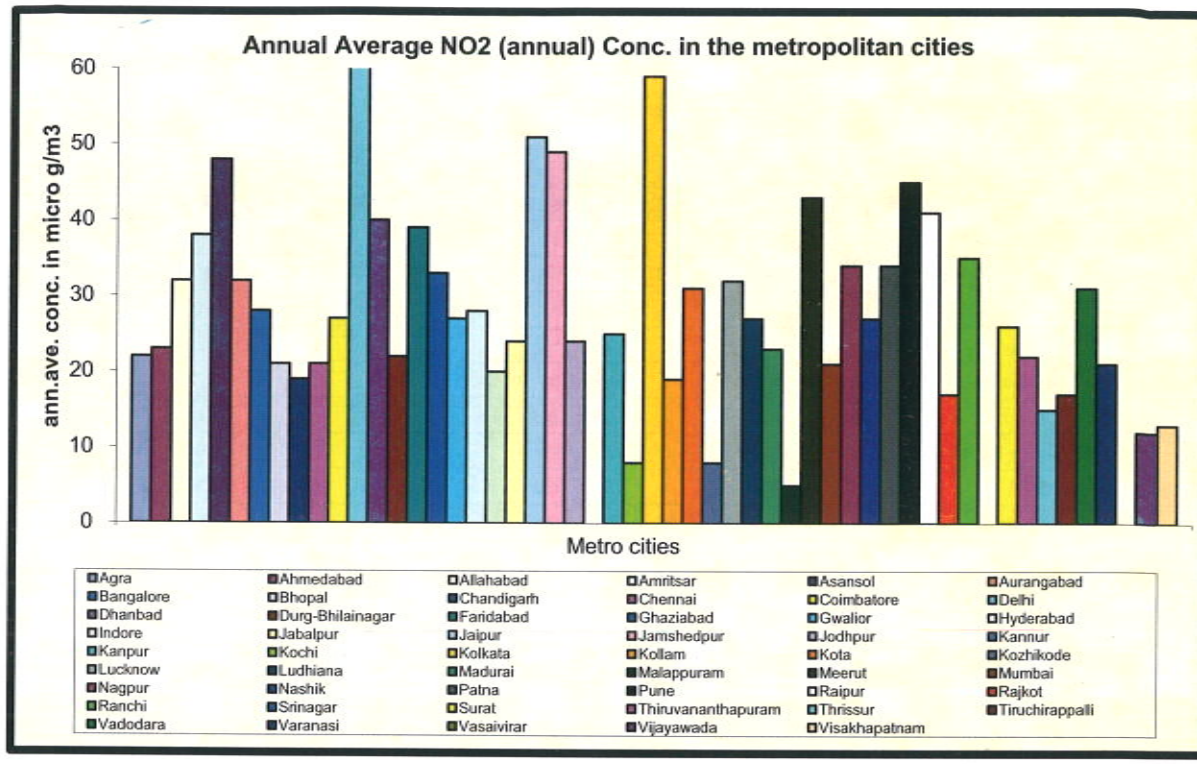


Figure 5.11 Ambient air quality with reference to Annual Average NO_2 Conc. in the metropolitan cities during year 2012

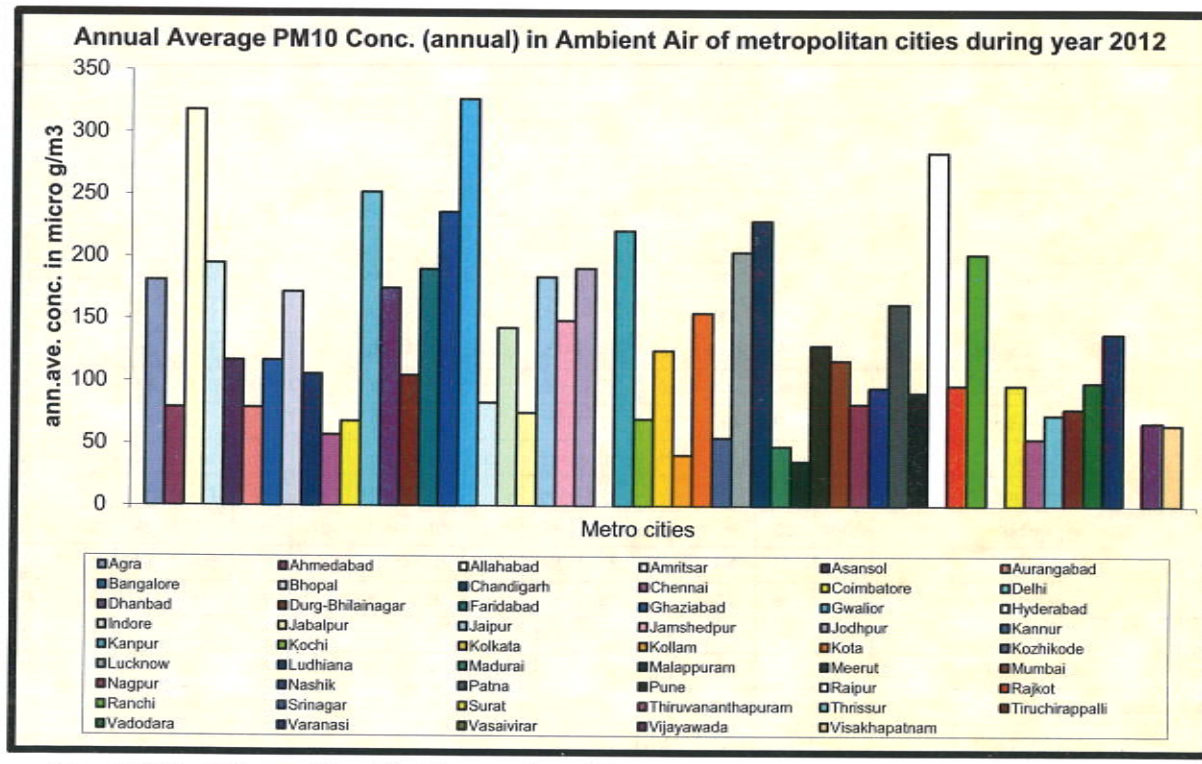


Figure 5.12 Ambient air quality with reference to Annual Average PM10 Conc. in the metropolitan cities during 2012

5.12.2 Air Quality trend in Metropolitan Cities

Table 5.12 Trend of Air Quality parameters (SO_2, NO_2 and PM_{10}) in 53 Metropolitan Cities last five years (2008 to 2012)

State	City	2008			2009			2010			2011			2012		
		SO_2	NO_2	PM10	SO_2	NO_2	PM10	SO_2	NO_2	PM10	SO_2	NO_2	PM10	SO_2	NO_2	PM10
Andhra Pradesh	Hyderabad	5	26	85	5	23	81	5	24	79	5	28	74	4	28	83
	Visakhapatnam	10	30	81	11	26	93	7	16	71	13	21	80	12	13	65
	Vijayawada	5	28	96	6	15	87	6	14	93	6	11	90	6	12	67
Bihar	Patna	7	39	120	5	37	146	7	40	181	4	36	158	6	34	162
Chandigarh	Chandigarh	2	15	95	2	15	81	2	16	92	2	16	102	2	19	106
Chattisgarh	Raipur	19	43	192	18	46	263	15	43	289	15	42	310	14	41	284
	Durg-Bhilainagar	17	25	109	15	25	112	9	22	109	8	22	104	8	22	105
Delhi	Delhi	6	57	214	6	50	252	5	55	261	6	61	222	6	61	252
Gujarat	Ahmedabad	12	20	88	16	21	94	15	21	95	14	25	83	12	23	79
	Surat	17	24	87	19	26	90	16	24	76	20	29	106	16	26	97
	Vadodara	14	28	77	16	30	86	17	29	93	18	30	92	16	31	99
	Rajkot	11	14	105	11	15	105	13	17	96	13	18	98	13	17	97
Haryana	Faridabad	13	24	150	15	23	154	18	29	164	20	43	174	12	39	190
Jammu & Kashmir	Srinagar															
Jharkhand	Jamshedpur	37	51	172	36	49	172	35	48	153	36	48	152	37	49	149
	Dhanbad	19	44	131	17	41	164	15	36	184	16	36	207	17	40	175
	Ranchi	18	33	173	18	32	179	19	35	172	18	35	165	18	35	202
Karnataka	Bangalore	15	41	100	14	37	112	14	31	89	14	28	91	14	28	117
Kerala	Kochi	4	12	43	4	12	42	4	11	36	3	13	38	3	8	70
	Kozhikhode	2	7	34	2	9	32	2	9	42	2	8	46	2	8	55
	Thrissur	-	-	-	-	-	-	2	7	31	2	14	33	2	15	73
	Mallapuram	-	-	-	-	-	-	2	5	30	2	5	30	2	5	36
	Thiruvananthapuram	10	26	67	9	21	61	9	24	56	10	23	58	9	22	54
	Kannur	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Kollam	-	-	-	-	-	-	3	15	47	4	20	53	4	19	41
Madhya Pradesh	Indore	10	19	196	9	17	183	14	18	120	12	14	132	12	20	143
	Bhopal	6	20	102	7	17	119	9	18	133	4	16	170	3	21	172
	Jabalpur	2	25	136	2	24	136	2	25	135	2	25	73	2	24	75
	Gwalior	9	16	163	10	18	187	12	20	308	12	20	311	13	27	327
Maharashtra	Mumbai	9	40	127	6	41	117	4	19	97	5	33	116	5	21	117
	Pune	22	37	103	25	40	88	29	39	82	32	58	113	22	45	91
	Nagpur	8	33	114	6	31	101	7	33	113	8	35	108	10	34	82
	Nashik	30	25	79	23	29	89	21	26	77	25	27	96	24	27	95
	Vsai-Virar	NA	NA	NA	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	9	32	79
Punjab	Ludhiana	10	40	271	9	38	253	9	32	214	11	28	221	11	27	229
	Amritsar	-	-	-	15	35	190	14	36	219	14	26	210	13	38	195
Rajasthan	Jaipur	6	35	127	6	36	151	6	37	164	6	37	139	9	51	184
	Jodhpur	6	24	176	6	23	140	6	22	181	5	23	168	6	24	191
	Kota	9	25	125	6	24	91	10	29	132	7	31	139	8	31	155

Tamilnadu	Chennai	9	14	63	9	17	73	9	15	59	9	24	92	12	21	57
	Coimbatore	6	30	75	6	27	77	5	27	78	4	26	102	5	27	68
	Madurai	10	24	42	10	25	42	11	25	47	11	24	44	10	23	48
	Tiruchirappalli	-	-	-	-	-	-	-	-	-	-	-	-	11	17	78
Uttar Pradesh	Kanpur	7	24	212	8	31	212	7	34	203	10	31	183	8	25	221
	Ghaziabad	20	16	236	29	31	239	30	37	290	31	39	231	29	33	236
	Agra	6	23	198	6	21	185	5	20	185	3	23	155	4	22	181
	Varanasi	16	19	106	17	20	125	18	20	127	17	20	127	18	21	138
	Meerut	10	42	115	8	44	119	8	47	166	5	45	123	4	43	129
	Allahabad	8	37	181	3	24	160	4	24	218	14	25	83	4	32	318
	Lucknow	8	36	190	8	36	197	8	34	204	8	33	189	8	32	204
West Bengal	Kolkata	8	64	103	11	68	126	11	62	99	12	65	113	9	59	125
	Asansol	7	74	135	8	55	154	8	66	141	7	56	145	13	48	117
18	**53**															

Remarks : Air Quality Data as reported by CPCB/SPCBs/PCCs/NEERI in monthly summary sheet/ environmental data bank/hard copy calculations for 2012 as per data available on 31st March 2013.

'-' Data not available. BDL – Below Detection Limit (i.e. less than 4 micrograms per cubicmeter for SO2 and less than 9 micrograms per cubicmeter for NO2). Data of Agra city is of Taj Mahal which has been identified as sensitive Area. National Ambient Air Quality Standard for Residential, Industrial, Rural and others Areas (Annual average) for SO2 = 50 microgramme per cubic metre, NO2 = 40 microgramme per cubic metre and PM10 = 60 microgramme per cubic metre and for ecologically sensitive are (Annual average for SO2 = 20 ug/m, NO2 = 30 ugm3 and PM10=60ug/m3. All values are in microgramme per meter cube (ug/m3) and annual average concentration.

5.2.3 Ambient air quality Monitoring in Delhi

The Central Pollution Control Board is monitoring ambient air quality at six locations in Delhi under NAMP for the past many years. The comparison of ambient air quality data during 2012 with previous year are discussed as under:

Sulphur dioxide (SO2):

The concentration of sulphur dioxide recorded at all the six locations was almost same and within the National Ambient Air Quality standard. The average of Sulphur dioxide at Delhi has been same as that of previous year.

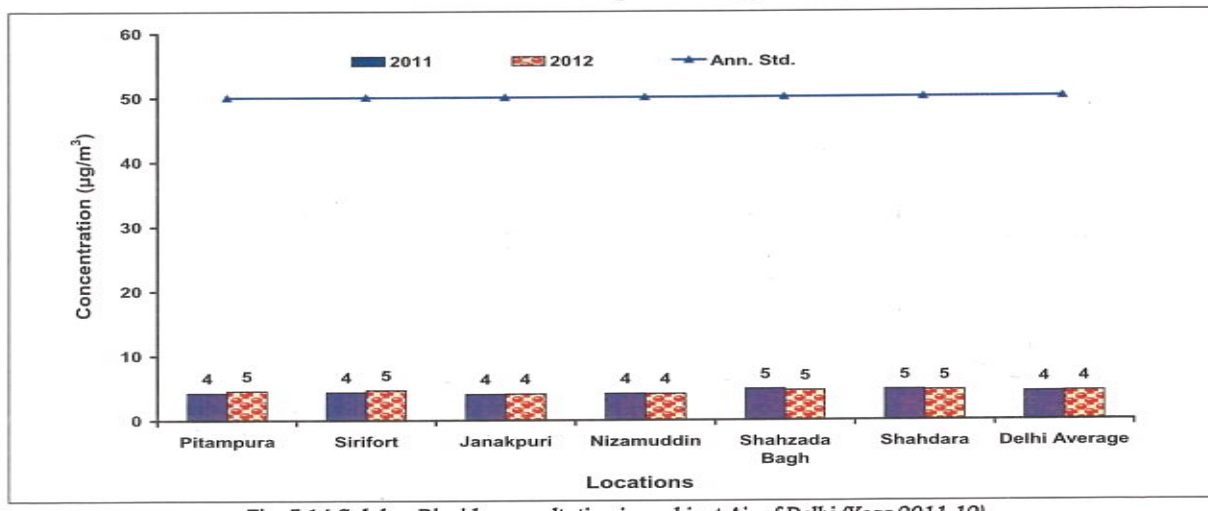


Fig. 5.14 Sulpher Dioxide consultation in ambient Air of Delhi (Year 2011-12)

Nitrogen dioxide (NO_2):

The concentration of nitrogen dioxide recorded at three locations shows an increasing trend while three locations show a decreasing trend. The concentrations recorded at all the locations were above National Ambient Air Quality standard. The average concentration for Delhi shows a slight decrease (about 2%) with respect to previous year; however the values has been above the national standard of 40 μg/m³.

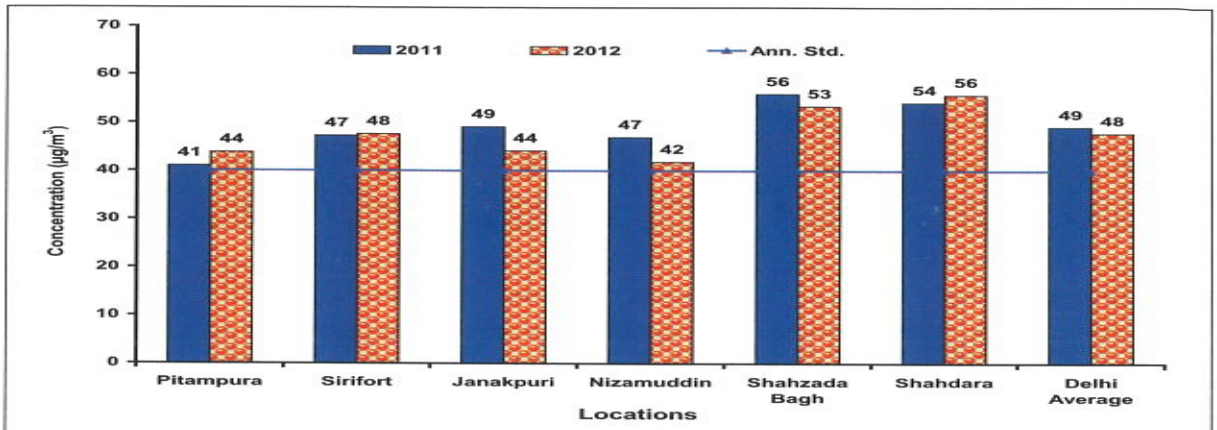


Fig. 5.15 NITROGEN DIOXIDE CONCENTRATION IN AMBIENT AIR OF DELHI (Year 2011 & 2012)

Particulate Matter (PM_{10})

The concentration of PM10 recorded at three locations (viz. Pitampura, Nizamuddin & Shahzadabagh) shows a decreasing trend indicated, while remaining three locations (viz. Sirifort, Janakpuri & Shahdara) indicated an increasing trend. The concentration of PM_{10} at all locations exceeded the national ambient air quality standard (60 μg/m³). The average concentration for Delhi shows an increase (about 7%) PM_{10} concentration with respect to previous year.

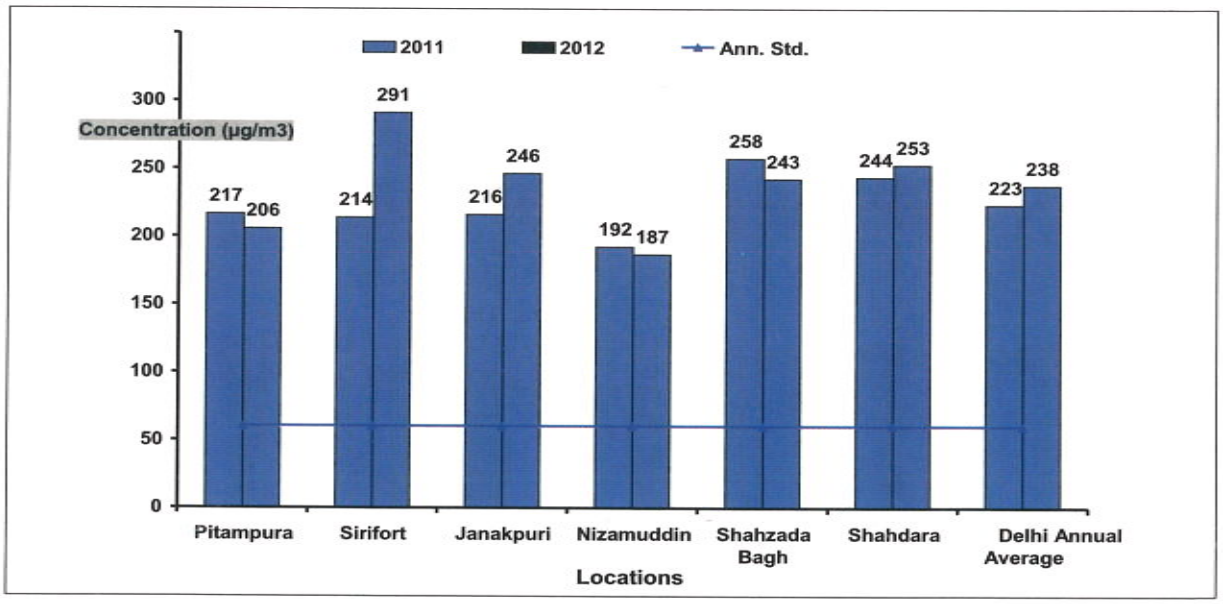


Fig. 5.16 PM_{10} Concentration in ambient air of Delhi (Year 2011 & 2012)

5.2.4 LEVELS OF PARTICULATE MATTER ($PM_{2.5}$) IN AMBIENT AIR OF DELHI

Particulate matter in the air includes a mixture of solid and liquid droplets. $PM_{2.5}$ refers to particulate matter with particle size of 2.5 micrometer or smaller. The sources of $PM_{2.5}$ emissions are from all types of combustion, sources including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and industrial processes. Fine particulate matter are of concern because they are risk to human health by inducing bronchitis, acute and chronic respiratory symptoms including shortness of breath and painful breathing.

Central Pollution Control Board is monitoring $PM_{2.5}$ at different location in Delhi using the USEPA reference sampler, Partisol sampler (Figure 5.17).

Figure 5.17 USEPA Reference sampler (PM2.5)

The sampling technique is low volume sampling at very low flow rate of 16.7 LPM and monitoring is carried out using 47 mm diameter PTFE filters. The Particulate Sample collected samples on filter papers are measured gravimetrically.

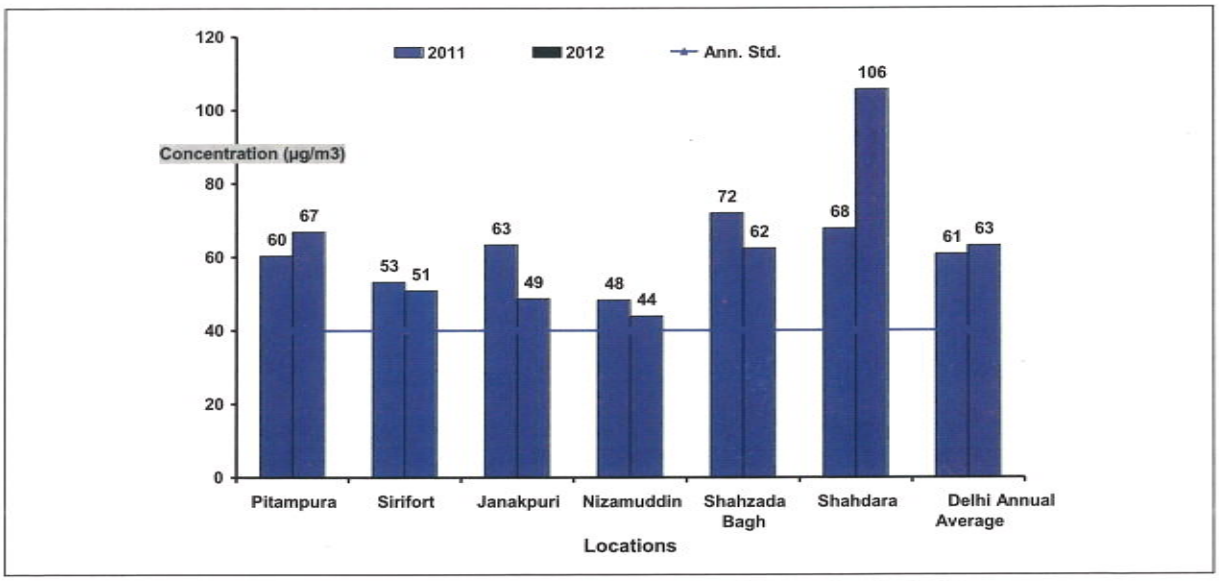


Fig 5.18 $PM_{2.5}$ Concentration in ambient air of Delhi (Year 2011 & 2012)

The comparison of annual mean concentration of $PM_{2.5}$ for the years 2011 & 2012, shows an increasing trend at two locations (viz. Pitampura & Shahdara) and decreasing trend at remaining four locations (viz. Sirifort, Janakpuri, Nizamuddin & Shahzadabagh) during the year 2012 as compared to year 2011. The annual mean concentration of $PM_{2.5}$ ranged in Delhi between 44 $\mu g/m^3$ (Nizamuddin) and 106 $\mu g/m^3$ (Shahdara) during the year 2012, which is marginally higher as compared to 2011. The concentration of $PM_{2.5}$ exceeded the prescribed national Ambient Air Quality annual standard of 40 $\mu g/m^3$ at all the locations.

5.2.5 Development of new Ambient Air Quality Monitoring Station at Pragati Maidan along Mathura Road

With a view to accommodate expansion of Metro rail, the model air quality monitoring station, located at BSZ Marg (ITO Intersection), operated by CPCB for past several years, had to be closed for the construction activity, however as an interim arrangement a new ambient air quality monitoring station has been developed and commissioned successfully at Pragati Maidan (Near Metro Station along Mathura Road). The monitoring activities have been started at this newly developed Air Quality Monitoring station in the month of September, 2012.

Figure 5.19: Ambient air quality monitoring station at Pragati Maidan

Figure5.20: Sampling system at Pragati Maidan

Figure 5.21: Inside laboratory at Pragati Maidan

The new station is being operated all days in year likewise earlier station at BSZ Marg Station is being visited regularly by number of Dignitaries, Environmentalist, Officials of SPCBs & PCCs, Students and various environment conscious people. This being an integrated station comprising both manual and automatic Air Quality measurement, attempts are made to operate the station as model station in the country.

5.2.6 Measurement of Mixing Height (with sodar system)

Mixing height is the height of the top of the surface based layer, in which vertical mixing is relatively vigorous and it gives the height upto which pollutants disperse in the atmosphere. A SODAR system is in continuous operation at Parivesh Bhawan, CPCB to probe the lower atmosphere. The data obtained from the SODAR system have been analyzed for calculation of mixing height. Mixing height in different

months and periods of high/low convective activity during year 2012 is presented in the following tables.

Table 5.13 : Mixing Height in Delhi (year 2012)

Month	Monthly Mean (m)	Maximum* (m)	Minimum* (m)
January	554	1706	100
February	664	1749	115
March	654	1749	115
April	674	1749	120
May	659	1706	110
June	687	1664	105
October (2nd half)	561	1600	95
November	445	1558	95
December	489	1579	90

*Hourly averages

Table 5.14 :Convective activity of lower atmosphere in Delhi

Month	Mostly occurring period of high convective activity	Mean Mixing Height in the period of high convective activity (m)	Mean Mixing Height in the period of low convective activity (m)
January	10 a.m. or 11 a.m. to 5 p.m.	1325	279
February	10 a.m. or 11 a. m to 5 p.m. or 6 p.m.	1440	329
March	Between 9 a.m & 11 a.m to 5 p.m. or 6 p.m.	1343	337
April	9 a.m or 10 a.m to 6 p.m	1387	319
May	9 a.m. to 6 p.m.	1202	316
June	Between 8 a.m. & 10 a.m. to 6 p.m.	1311	295
October (2nd half)	10 a.m.to 6 p.m.	1239	249
November	11 a.m. to 4 p.m.	1140	241
December	10 a.m. or 11 a.m. to 4 p.m. or 5 p.m.	1211	285

The monthly mean mixing height was minimum in November i.e. 445 metres. Duration of high convective activity also was minimum in November. Minimum mixing height measured was in December i.e. 90 metres. Maximum mixing height measured was in February, March and April i.e. 1749 meters. Mean mixing height in the period of low convective activity was minimum in November 2012 i.e. 241 meters followed by October 2012 (249 meters.). Diurnal variation of mixing height for the month of November 2012 (the month having low convective activity in 2012) is presented in figure 5.22.

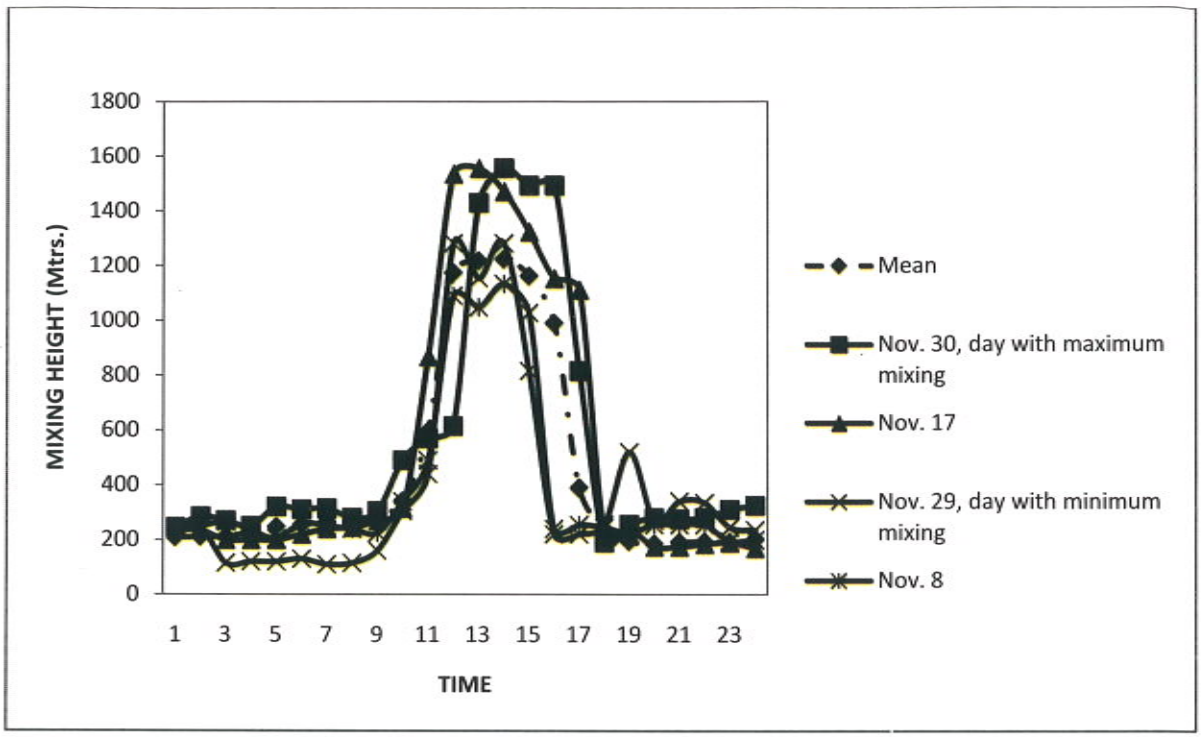


Figure 5.22 Diurnal Variation of Mixing Height - November 2012

5.2.7 Particulate Metals (lead, nickel and arsenic) in the Ambient Air of Delhi during year 2012

Central Pollution Control Board is monitoring lead, nickel and arsenic in fine particulate (PM10) at six locations (Pitampura - PP, Sirifort - SF, Nizamudin - NZ, Janakpuri - JP, Shahdara - SH, Shahzada Bagh – SB) under NAMP. BSZ Marg, ITO was selected as a kerbside at busiest traffic intersection in Delhi. Due to construction work of Delhi Metro Railway Corporation, the ITO Monitoring Station has been shifted to Pragati Maidan – PM. During the shifting and reinstallation of station the monitoring was kept suspended between June to August, 2012.

The Lead in particulate matter is being monitored since year (1997). The monitoring of Particulate Nickel was initiated three years back while Arsenic was added as particulate parameter under NAMP in Delhi and Kerbside, last year.

5.2.8 Metals in Fine Particulate at NAMP sites

The concentrations of particulate lead in the ambient air particulate of Delhi at six NAMP stations are depicted in Figure 5.23

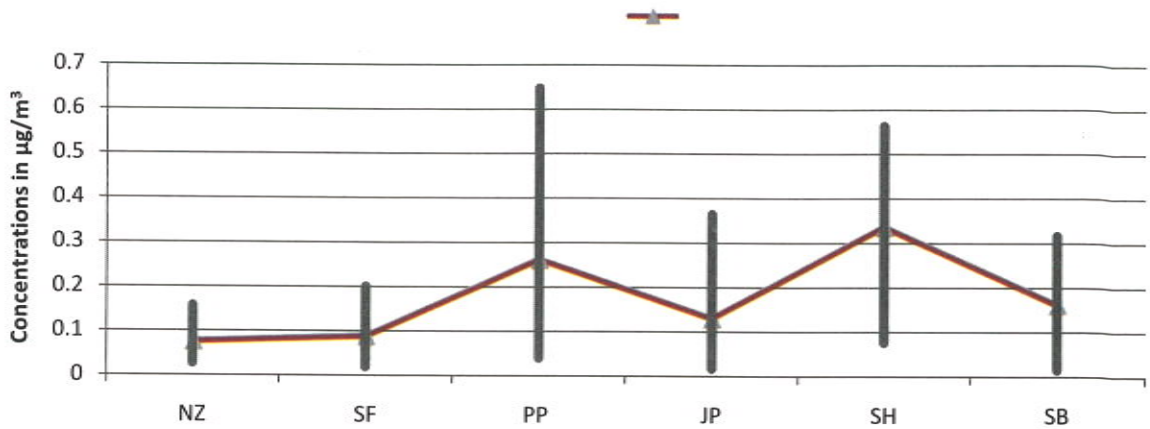


Figure 5.23: Average concentration of Nickel in PM_{10} at Various Monitoring Stations at Delhi, During Year 2012

It is evident from the figures that the concentrations of Lead in particulates had been well within the prescribed Ambient Air Quality Standards limit (1 µg/m_3). The average concentration (Average of all locations) was reported to be 0.176 µg/m_3. The maximum annual average concentration (0.647 µg/m_3) was observed at Pitampura, while the lowest at Shahzadabagh. The overall concentration ranges fluctuated between 0.015 – 0.647 ± 0.142 µg / m_3. The concentrations of particulate Nickel in the ambient air of Delhi are depicted in Figure – 5.25 and Figure 5.26.It is evident from the figures

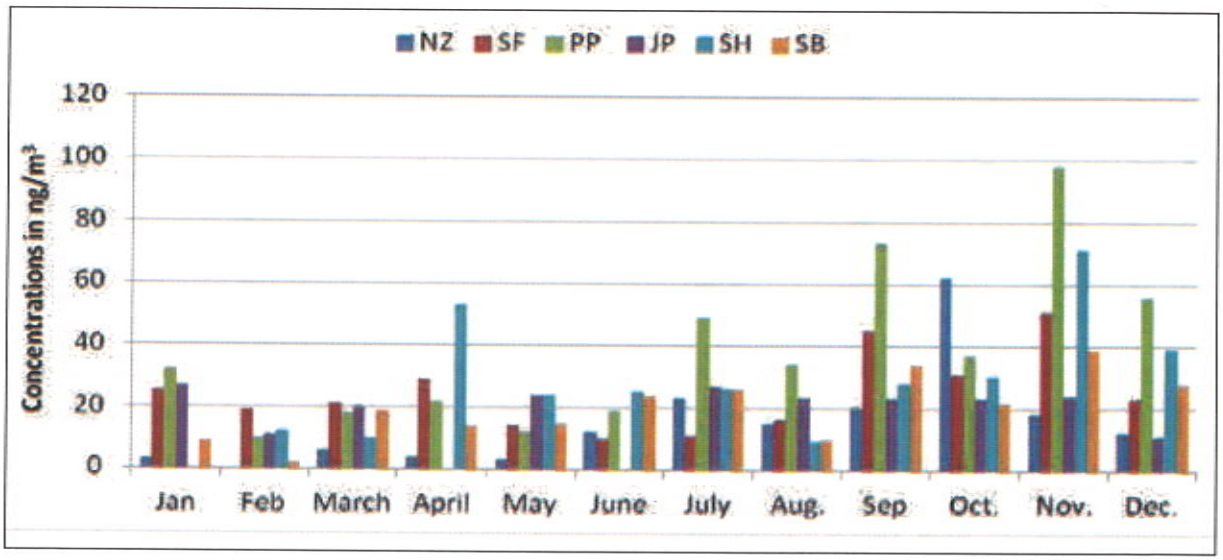


Figure 5.24: Monthly Various of Lead in PM_{10} at Various Monitoring Stations at Delhi, During Year 2012

that the average concentrations of Nickel had exceeded the prescribed limit (20 ng / m3) of NAAQS at all the locations except Nizamuddin. The average concentration of Nickel in Ambient Particulate Matter in the city (Average of all locations) was reported to be 25.2 ng / m3. The maximum annual average concentration (98 ng/m3) was

observed at Pitampura. The overall concentration ranges fluctuated between 2 – 98 ± 17.8 ng / m3 with highest and lowest concentrations reported at Pitampura and Shahzadabagh respectively.

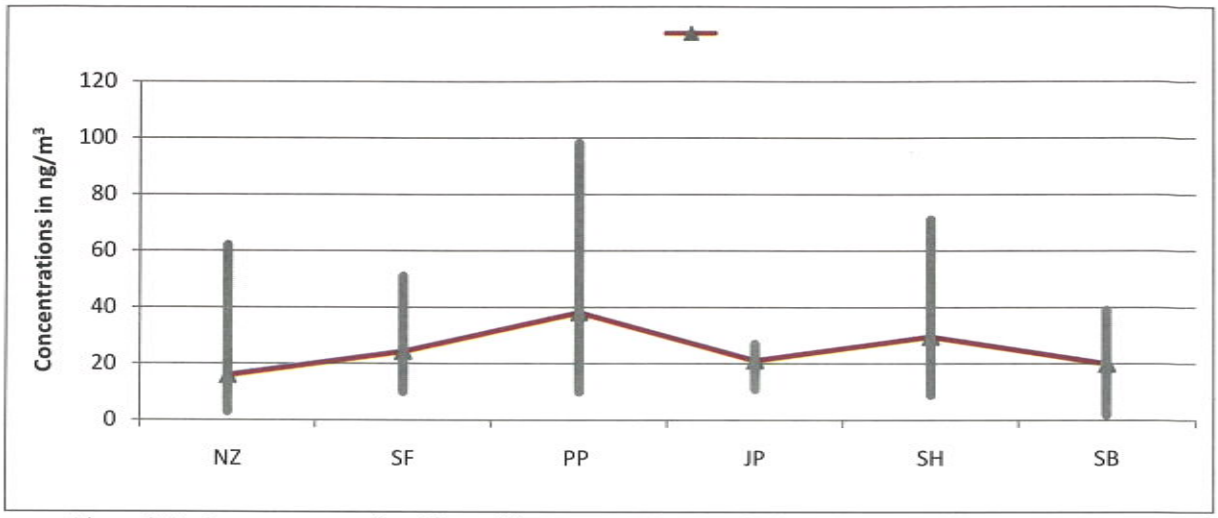


Figure 5.26: Average concentration of Arsenic in PM_{10} at Various Monitoring Stations at Delhi, During Year 2012

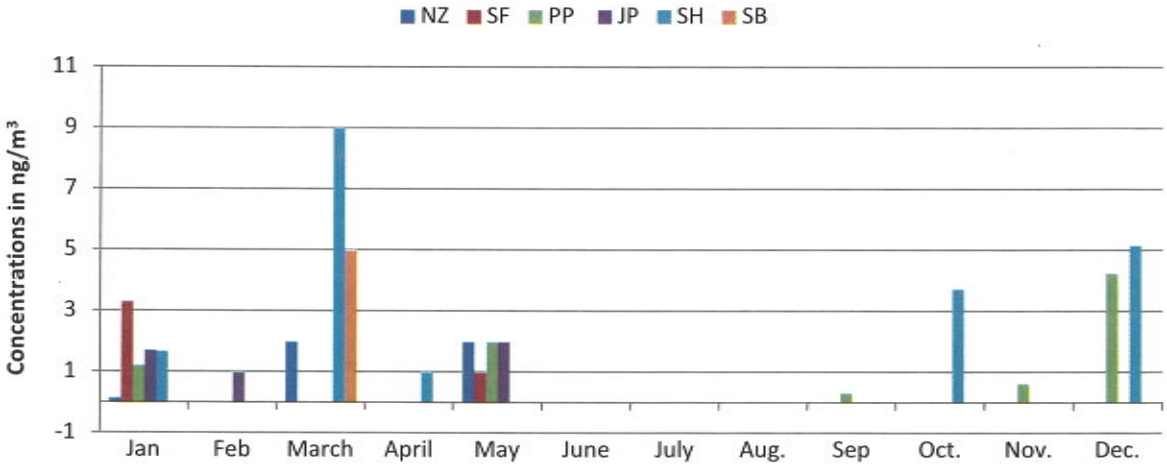


Figure 5.27: Monthly Various of Arsenic in PM_{10} at Various Monitoring Stations in Delhi, During Year 2012

The concentration of particulate Arsenic in the ambient air of Delhi has been depicted in Figure – 5.27 and Figure 5.28. It is evident that the average concentration of Arsenic had not exceeded the prescribed limit (6 ng /m_3) of NAAQS at any sampling Location. The average concentration of Arsenic in Ambient Particulate Matter in the city (Average of all locations) was reported as 0.65 ng/m_3. The maximum concentration (9 ng / m_3) was observed at Shahdara. The overall concentration ranges was 0.001 (BDL) – 9 ± 1.64 ng / m_3 with highest and lowest concentrations reported at Shahdara and Sirifort respectively.

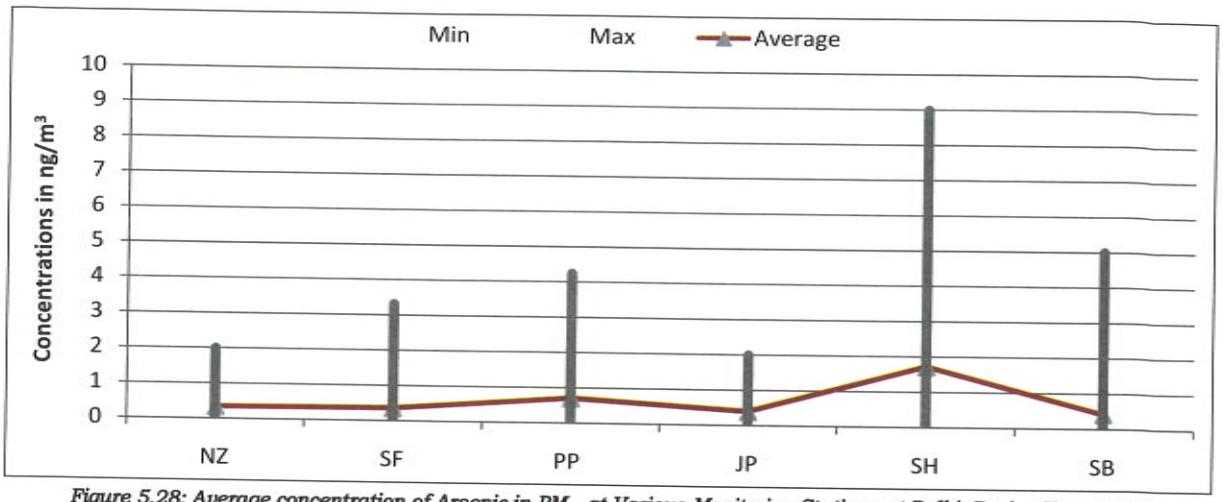


Figure 5.28: Average concentration of Arsenic in PM_{10} at Various Monitoring Stations at Delhi, During Year 2012

5.2.9 Characterization and Source apportionment of $PM_{2.5}$

The characterization of about 35 day's data of PM2.5 collected form a sampling location on Teflon and quartz filter matrix using multi channel size selective sampler was characterized for Ions, OC-EC and Elements. The speciation data was utilized to identify the contribution of dominant sources using receptor modelling, Positive Matrix Factorization (PMF 2).

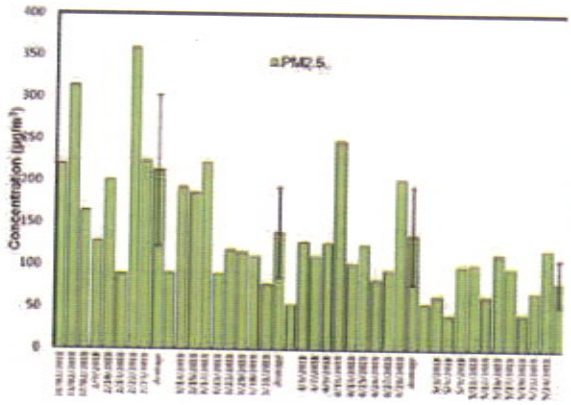


Figure 5.29: Variation in $PM_{2.5}$ data over the study period

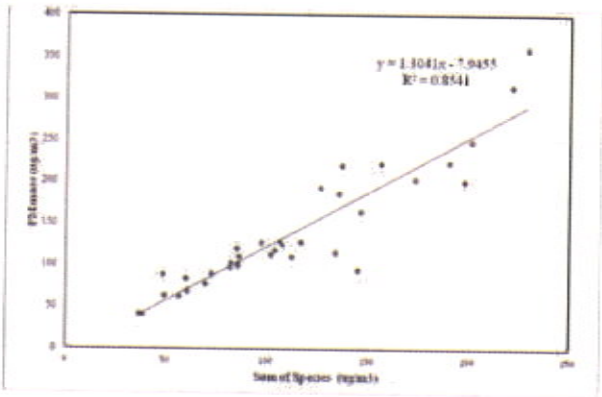


Figure 5.30: Plot Between $PM_{2.5}$ and sum of species monitored

The PM2.5 concentration was found highest in February (212±90 µg/m3) and declining in successive months, lowest concentration was observed during May (81±27 µg/m3). During the pre-monsoon period (April and May) the meteorological factors such as high wind speed and temperature supported the dilution and dispersion of aerosol resulting in lower PM2.5 concentration. Chemical constituents including carbonaceous fraction, ions and trace elements constituted 68, 78, 81 and 77% of total PM2.5 in February, March, April and May respectively. The unexplained mass varies from 19% in April to 32% in February. Unexplained mass could be due to unidentified organics (other than organic carbon) and water. The regression coefficient between total species monitored and PM2.5 mass was 0.85.

The summary of PMF model output is presented in figure 5.31. Eight source factors were earmarked by the model. The highest individual contribution was biomass burning (28%), cumulative contribution of metals was 32% (Non Ferrous Smelters, Chromium and Copper). 11% contribution from sea salt may be indicative only as the air mass movement during this period does not support the possibilities of marine influence.

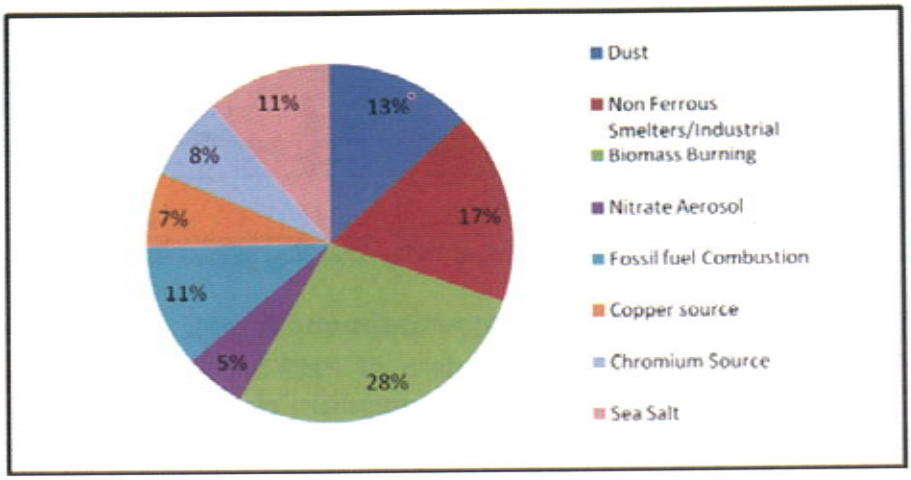
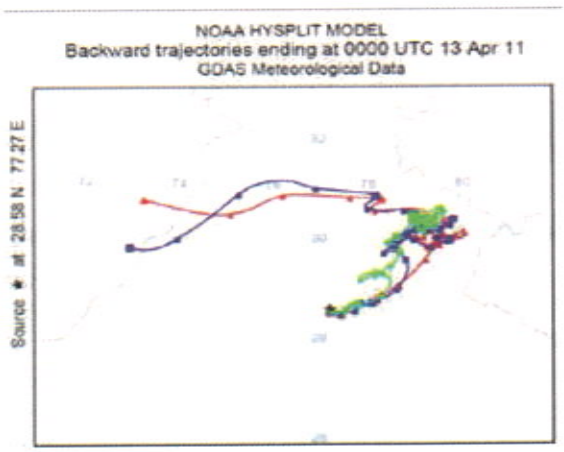
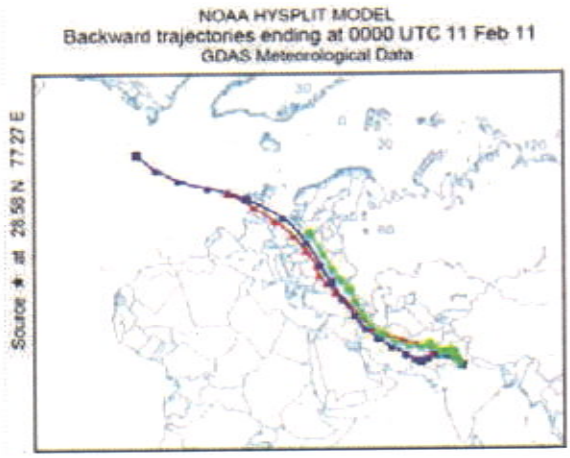


Figure 5.21 Percentage Source Contribution of 8 factors derived from PMF model

The back trajectory anlysis was done for the study period using NOAA HYSPLIT model. The finding suggested that the air mass movement influencing the concentration may have both local and long range transboundary movement from north western countries.



Local Air mass Movement
Figure 5.32 Seven day back trajectories using NOAA HYSPLIT model (Dust)



Long Range Air Mass Movement
Figure 5.33 Seven day back trajectories using NOAA HYSPLIT model (Sea Salt?)

In the case of local influence the abundance of non-ferrous metal might be justified with sources of metal in small scale industries operating in north India (UP, Haryana, Punjab etc.)

The long range transport might support the abundance of Chlorides in $PM_{2.5}$ as the route of air mass movement is highly rich in salt mines (Northern Pakistan, Afganistan, Tazakistan etc.). This issue has to be scientifically investigated through atomospheric research as most of the receptor model like PMF, CMB has inbuilt limitation of colinearity in identifying the sources.

5.2.10 Ambient Air Quality Monitoring at Lucknow

Ambient Air Quality Monitoring Station at Vikas khand, Gomti Nagar, Lucknow (residential area) had been established with air quality monitoring facilities for air pollutants viz. PM_{10}, $PM_{2.5}$, SO_2 and NO_2. The Monitoring station remain operational on all working days. $PM_{2.5}$ and SO_2 are monitored twice in a week. The data is being regularly submitted to Air Laboratory at CPCB, HQs, Delhi.

PM10 sampler (Respirable dust sampler: Make :Envirotech, APM: 460 NL for PM_{10} and APM 411 TE for gases) and $PM_{2.5}$ sampler (Make Thermo: Partisol FRM 2000) are used for Ambient air quality monitoring.

PM10 in ambient air is monitored on 8-hourly intervals gaseous sampling is being undertaken on 4-hourly intervals while, $PM_{2.5}$ sampling is generally carried out on 24-hourly intervals. Ambient Air samples are analysed at laboratory of CPCB, Zonal Office Lucknow using standard methods.

The Trend of monthly average concentration of pollutants monitored during the year are depicted in Figure 5.34.

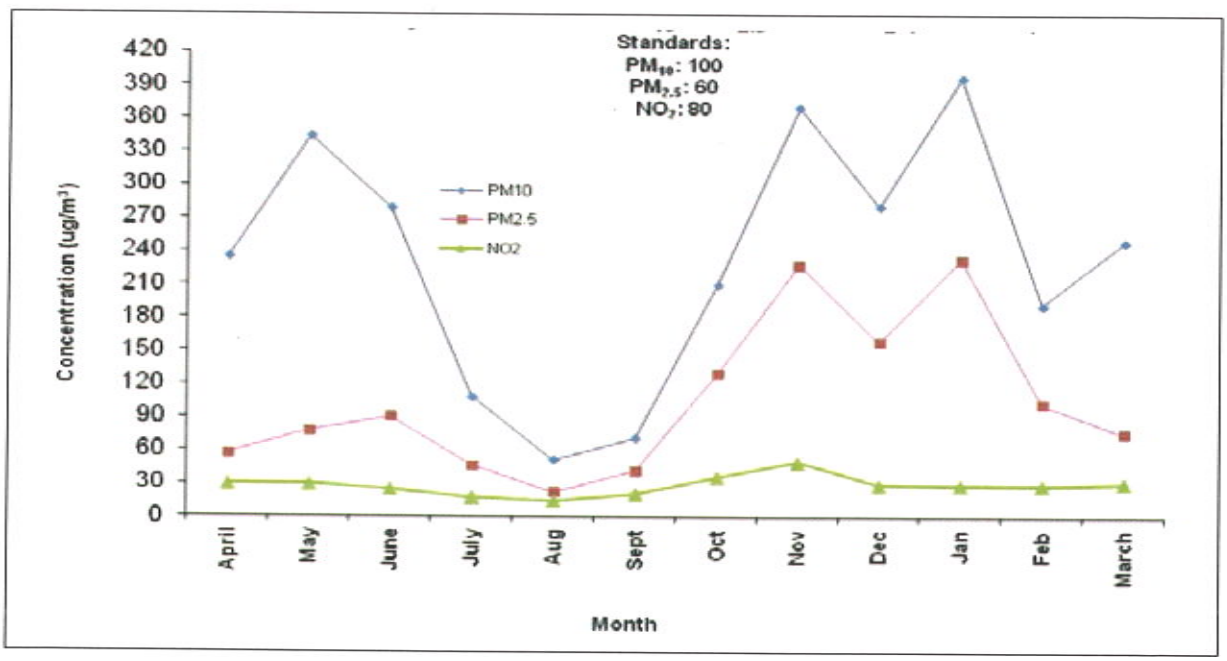


Figure 5.34 Monthly Variation in PM_{10}, $PM_{2.5}$ and NO_2 at Lucknow (2012-13)

5.2.11 Ambient Air Quality Monitoring at Kanpur

Indian Institute of Technology (IIT), Kanpur has been entrusted with the task of operation and maintenance of Ambient Air Quality station at Vikas Nagar, Kanpur. Parameters including SPM, PM_{10}, SO_2 and NO_2. are monitored. Observations as per report received from IIT, Kanpur for the period March 15, 2012 to March 31, 2013 are summarized below:

- PM_{10} and NO_2 levels do not correlate suggesting that PM_{10} may not be originating from the combustion sources alone.
- Generally in the night PM_{10} and SPM levels are lower than day-time levels. This can be attributed due to more activities during day time as compared in the night.
- NO_2 level has been found highest in the month of November.
- Ratio of PM_{10} & SPM has been found higher in night time suggesting that in night, contribution of coarse SPM has been less, which generally comes from soil and urban activities.
- NO_2 concentration observed at peak during evening and morning hours due to high traffic.
- The data show warning in terms of four hourly (6 pm to 10 pm) peak concentrations in winter months: December 99 $\mu g/m_3$; January 131 µg/m3; and February 94$\mu g/m_3$.
- There are enough evidences/warnings that in addition to PM_{10}, NO_2 may also exceed the air quality standard of 80 $\mu g/m_3$ (24-hr. average), if no action is taken to control NOx emissions in the city.

5.2.12 Continuous Ambient Air Quality Monitoring at Lucknow

Three Continuous Ambient Air Quality Monitoring Stations have been installed by Environment SA France and Environment SA (India) Pvt. Ltd. at specific representative locations in Lucknow city. Stations are being operated and Maintained by Environment S.A. (India) Pvt. Ltd. and the data of various air pollutants including meteorological data are being disseminated online. Data validation is being supervised by Central Pollution Control Board, Lucknow through regular calibration of system.

The air pollutants status and trend monitored at three monitoring stations during the year are as below:

A. Kendriya Vidyalaya (Central School), Aliganj:

Area Category: Residential (Latitude- 26o54' 2.2" N, Longitude- 80o56' 53.6" E) Parameters monitored: Temperature, Relative Humidity, Wind Speed, Wind Direction, Vertical Wind Speed, Barometric Pressure, Solar Radiation, SO_2, NO, NO_2, NO_x, PM_{10}, O_3, CO, Benzene, Toluene, Ethyl Benzene, MP-Xylene, O-Xylene.

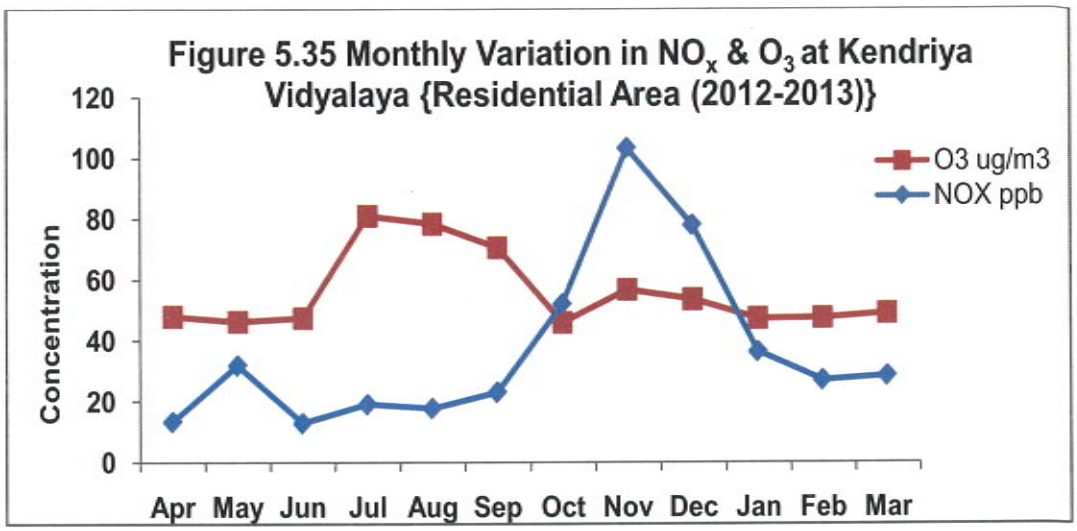


Figure 5.35 Monthly Variation in NO_x & O_3 at Kendriya Vidyalaya {Residential Area (2012-2013)}
Concentration
120
100
80
60
40
20
0
Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar
O3 ug/m3
NOX ppb

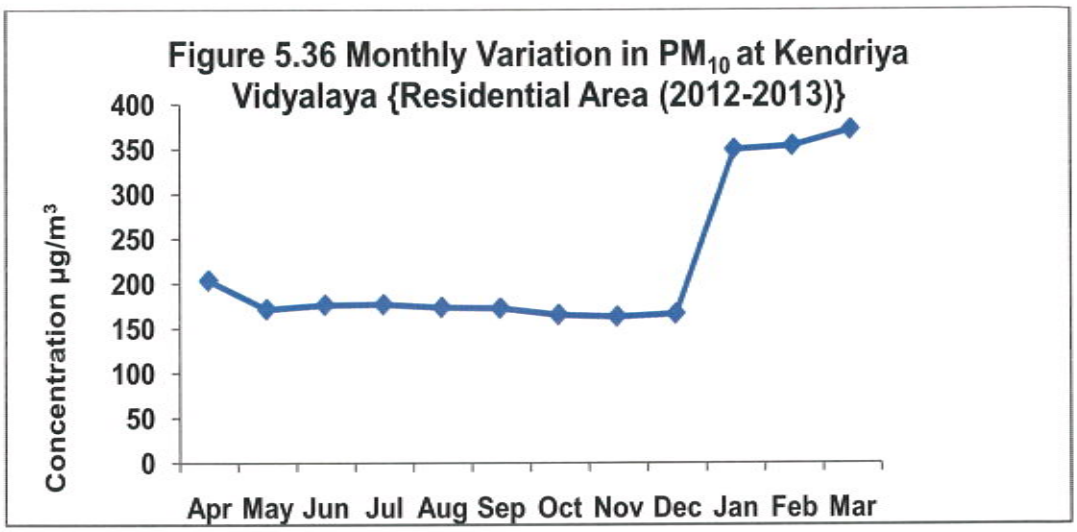


Figure 5.36 Monthly Variation in PM_{10} at Kendriya Vidyalaya {Residential Area (2012-2013)}
Concentration µg/m³
400
350
300
250
200
150
100
50
0
Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar

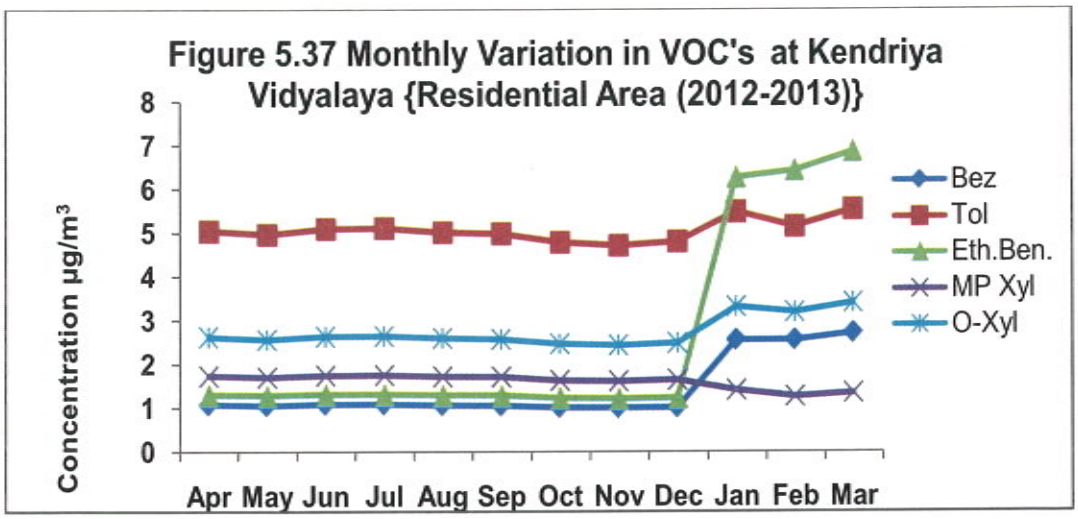


Figure 5.37 Monthly Variation in VOC's at Kendriya Vidyalaya {Residential Area (2012-2013)}
Concentration µg/m³
8
7
6
5
4
3
2
1
0
Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar
Bez
Tol
Eth.Ben.
MP Xyl
O-Xyl

B. Dayanidhan Park, Lalbagh:

Area Category: Commercial (Latitude- 26°50'46.4" N, Longitude- 80°56'16.5" E)

Parameters monitored: Temperature, Relative Humidity, Wind Speed, Wind Direction, Vertical Wind Speed, Barometric Pressure, Solar Radiation, SO_2, NO, NO_2, NO_x, PM_{10}, O_3, CO, Benzene, Toluene, Ethyl Benzene, MP-Xylene, O-Xylene.

Figure 5.38
Monthly Variation in NO_x & O_3 at Dayanidhan
{Commercial Area (2012-2013)}

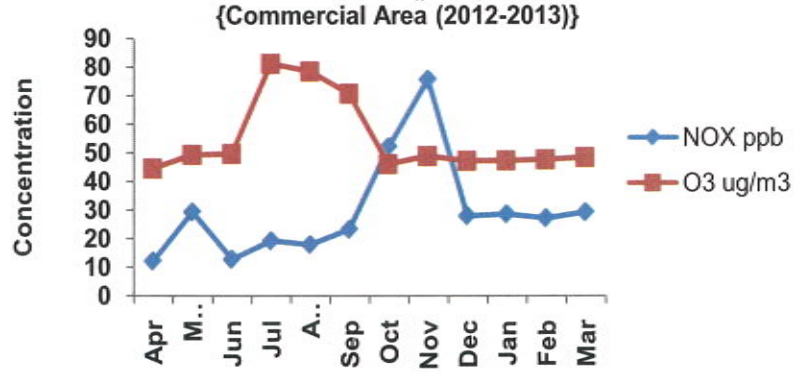


Figure 5.39 Monthly Variation in PM_{10} at Dayanidhan
{Commercial Area (2012-2013)}

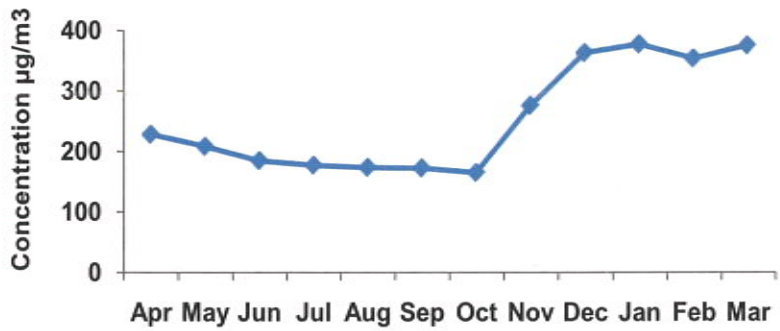
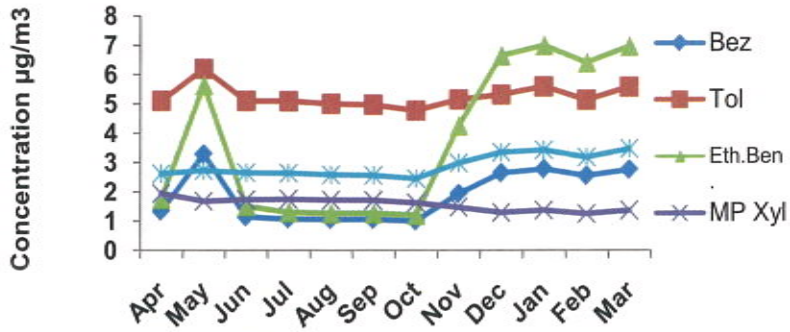


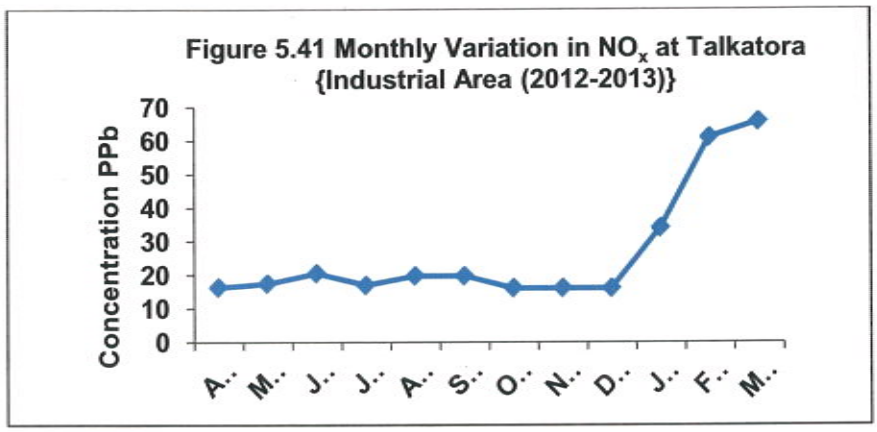
Figure 5.40 Monthly Variation of VOC's at Dayanidhan
{Commercial Area (2012-2013)}

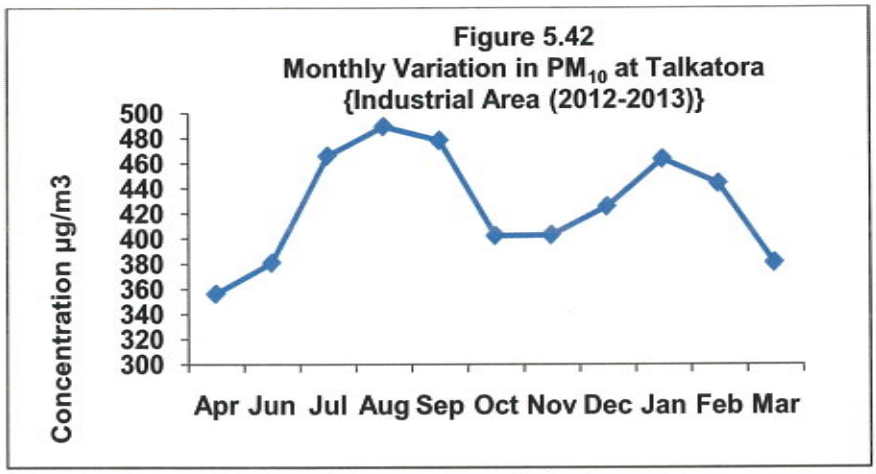


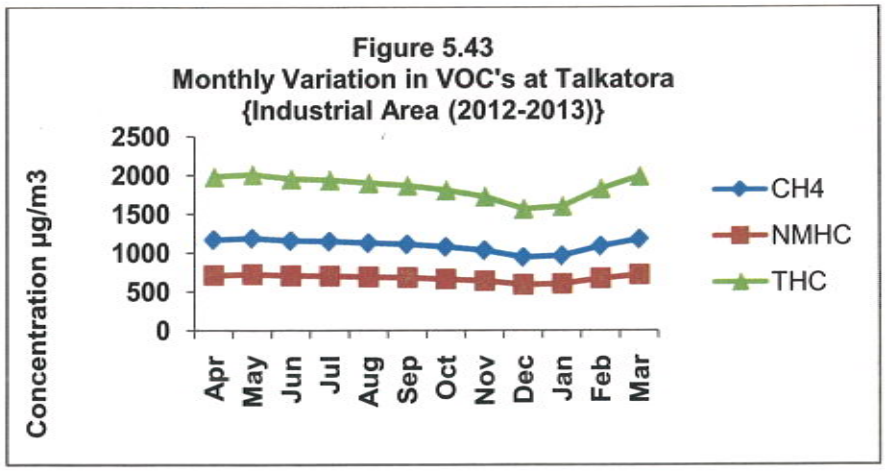
C. Talkatora Industrial Area, Talkatora:

Area Category: Industrial (Latitude- 26°50'4.1" N, Longitude- 80°53'42.0" E)

Parameters monitored: Temperature, Relative Humidity, Wind Speed, Wind Direction, Vertical Wind Speed, Barometric Pressure, Solar Radiation, SO_2, NO, NO_2, NO_X, PM_{10}, NH_3, CO, Methane, Non-Methane, Total Hydrocarbon.







5.2.13 Ambient Air Quality Monitoring at Agra:

The ambient air quality monitoring (AAQM) at Agra being undertaken by Central Pollution Control Board at Four locations viz. Tajmahal, Etmad-ud-daulah, Rambagh (all protected monuments) and Nunhai (Industrial Area) since year 2002 for SPM, RSPM, SO_2 and NO_2. The AAQM data indicated that lowest concentration of pollutants has been found at Tajmahal and highest at Nunhai monitoring station. The annual average values of particulate matter are higher than the prescribed standard for sensitive areas, while the annual average concentration of SO_2 and NO_2 are within Air Quality standards at all the stations except at Nunhai, where NO_2 values marginally exceeded the Annual Air Quality standards.

The annual average concentration (annual average of four monitoring stations) was found as SPM 431 $\mu g/m_3$, RSPM 195 $\mu g/m_3$, SO2 4 $\mu g/m_3$ and NO_2 25 $\mu g/m_3$ during year 2012.

Table 5.15 : Ambient Air Quality Monitoring Data at Agra during year 2012

		SO_2	NO_2	RSPM	SPM
Tajmahal	Avg	5	18	178	332
	Max	6	30	377	562
	Min	4	9	27	58
	EF*	**0.2**	**0.6**	**3.0**	**4.7**
Etmad-ud-daulah	Avg	4	22	183	422
	Max	5	33	399	724
	Min	4	13	36	105
	EF*	**0.2**	**0.7**	**3.1**	**6.0**
Rambagh	Avg	4	25	180	416
	Max	5	40	394	650
	Min	4	15	38	112
	EF*	**0.2**	**0.8**	**3.0**	**5.9**
Nunhai	Avg	5	34	238	554
	Max	7	46	484	871
	Min	4	23	56	157
	EF*	**0.3**	**1.1**	**4.0**	**7.9**
	Annual Std.	20	30	60	70

All values are in µg/m3 except EF

EF based on Revised National Ambient Air Quality Standards 2009, except SPM (based on 1994 standard)

The annual average of SPM and RSPM concentration has been found higher than previous years at all stations. The concentration of NO_2 has decreased at Tajmahal and Itmad-ud-Daulah, however it remained constant at other two stations. The level of SO_2 remained constant as previous year at all stations. All parameter's concentration has been found higher during winter at all the monitoring stations except SPM at Etmad-ud-daulah. The statistical analyses of the AAQM data have been presented at Table-5.16.

The Air Quality Data has been analyzed and presented in Table 5.16. During year at Tajmahal SO_2 ranged between 4 – 12 µg/m_3 with annual average of 4 µg/m_3, the NO_2 value were found in the range of 10 – 68 µg/m_3 with annual average of 19 µg/m_3, the RSPM concentration ranged between 85 – 610 µg/m_3 with annual average of 177 µg/m_3 and SPM has been found in the range of 162 – 921 µg/m_3 with annual average of 323 µg/m_3. SO_2 and NO_2 have been within the limit but RSPM (EF 2.95) exceeded the annual standards limit.

Table 5.16 : Ambient Air Quality data Analysis at Agra (Year 2012-13)

Monitoring Stations	AAQM data Analysis-2012-13				
		SO_2	NO_2	RSPM	SPM
Tajmahal	**Avg.**	**4**	**19**	**177**	**323**
	Max.	12	68	610	921
	Min.	4	10	85	162
	SD	3	8	102	149
	EF.	0.21	0.62	2.95	4.61
Itmad Ud-daulah	**Avg.**	**4**	**23**	**178**	**395**
	Max.	7	59	575	1035
	Min.	4	13	94	222
	SD	0	8	103	172
	EF.	0.2	0.76	2.96	5.64
Rambagh	**Avg.**	**4**	**25**	**174**	**397**
	Max.	8	58	621	904
	Min.	4	13	95	239
	SD	0	8	96	169
	EF.	0.2	0.82	2.89	5.67
Nunhai	**Avg.**	**5**	**34**	**237**	**542**
	Max.	13	66	620	1138
	Min.	4	21	140	342
	SD	1	7	119	212
	EF.	0.24	1.13	3.95	7.74

*EF based on Revised National Ambient Air Quality Standards 2009, except SPM (based on 1994 standards)

Note: (All values are in µg/ m3 except EF, SD), Avg.: Annual Average; Max.: daily Max. Concentration; Min.: daily Min. Concentration during year

At Itmad-ud-Daulah, the ambient air SO2 ranged between 4 – 7 µg/m_3 with annual average 4 µg/m_3, the NO2 value found in the range of 13 – 59 µg/m_3 with annual average 23 µg/m_3, the RSPM concentration ranged between 94 – 575 µg/m_3 with annual average of 178 µg/m_3 and SPM has been found in the range of 222 – 1035 µg/m_3 with annual average 395 µg/m_3. SO_2 and NO_2 have been within the limit but RSPM (EF 2.96) exceeded the annual air quality standard limit.

At Rambagh, the ambient air SO_2 ranged between 4 – 8 µg/m_3 with annual average 4

$\mu g/m_3$, the NO_2 values were found in the range of 13 – 58 $\mu g/m_3$ with annual average of 25 $\mu g/m_3$, the RSPM concentration ranged between 95 – 621 $\mu g/m_3$ with annual average of 174 $\mu g/m_3$ and SPM has been found in the range of 239 – 904 $\mu g/m_3$ with annual average of 397 $\mu g/m_3$. SO_2 and NO_2 have been within the limit but RSPM (EF 2.89) exceeded the annual Air Quality standard limit.

At Nunhai, Ambient Air SO2 ranged between 4 – 13 $\mu g/m_3$ with annual average 5 $\mu g/m_3$, the NO_2 value was found in the range of 21 – 66 $\mu g/m_3$ with annual average of 34 $\mu g/m_3$, the RSPM concentration ranged between 140 – 620 $\mu g/m_3$ with annual average of 237 $\mu g/m_3$ and SPM in the range of 342 – 1138 $\mu g/m_3$ with annual average of 542 $\mu g/m_3$. SO_2 has been found within the limit but NO_2 (EF 1.13), RSPM (EF 3.95) exceeded the annual standard limit.

Seasonal Trend of Pollutants:

It may be seen from seasonal analysis of AAQM data that the concentration of pollutants was observed highest during winter season while least in rainy season (Table 5.17). Seasonal data clearly indicated that the Tajmahal monitoring station is least polluted and Nunhai is the highest, while Rambagh stands at second least polluted position and Itmad-ud-daulah at third least polluted monitoring location in Agra.

Table 5.17 : Seasonal Trend of Air Pollutants in Agra during year 2 012-13

	Tajmahal			
	SO2	**NO2**	**RSPM**	**SPM**
Summer	4	16	169	382
Rainy	4	15	90	183
Winter	5	26	272	403
	Itmad-ud-daulah			
Summer	4	20	167	456
Rainy	4	17	93	246
Winter	4	32	274	482
	Rambagh			
Summer	4	23	172	495
Rainy	4	19	89	245
Winter	4	32	260	451
	Nunhai			
Summer	6	32	231	619
Rainy	4	30	136	347
Winter	5	39	343	660
Remark : All values are in $\mu g/m^3$				

Figure 5.44 Seasonal Trend of RSPM & SPM at Tajmahal

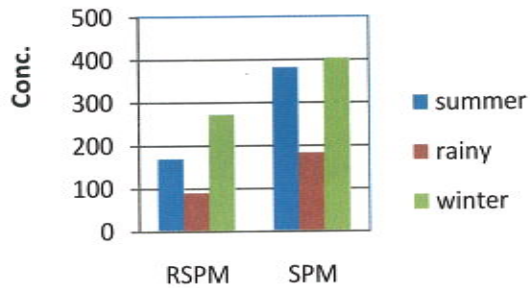


Figure 5.45 Seasonal Trend of RSPM & SPM at Etmad

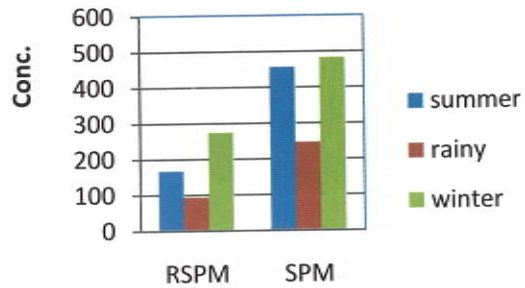


Figure 5.46 Seasonal Trend of RSPM & SPM at Rambagh

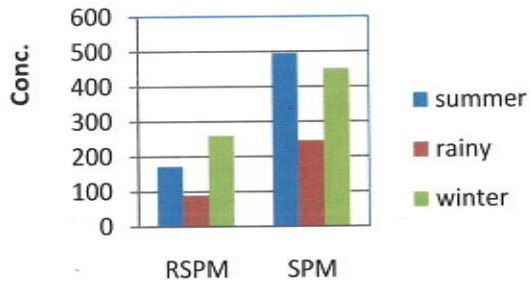
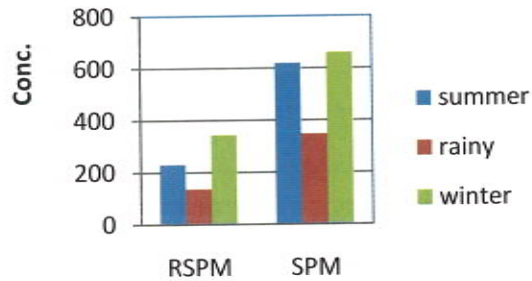


Figure 5.47 Seasonal Trend of RSPM & SPM at Nunhai



Seasonal Trend of RSPM:

The seasonal trend of RSPM at various monitoring stations in Agra have been calculated and presented at Figure 5.48 to 5.51. The RSPM ranged from 48 to 51% during winter; 31 to 33% during summer and 17 to 19% during rainy season in Agra. It indicates that RSPM does not easily disperse due to inverse weather and calm conditions during winter and results in higher concentration of pollutant close to earth surface.

Figure 5.48 Seasonal Trend of RSPM in Tajmahal

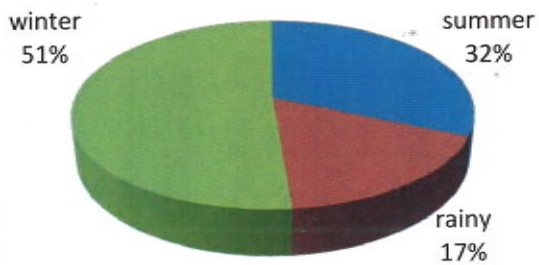


Figure 5.49 Seasonal Trend of RSPM in Etmad

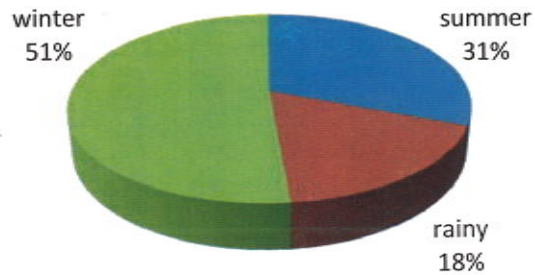


Figure 5.50 Seasonal Trend of RSPM in Rambagh

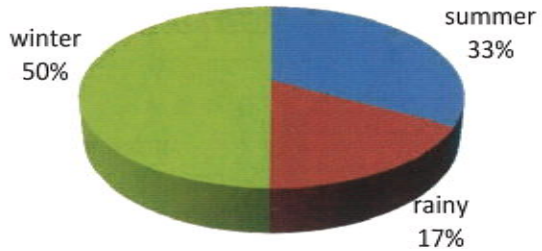
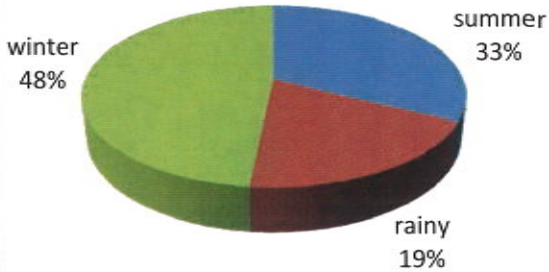


Figure 5.51 Seasonal Trend of RSPM in Nunhai



NRSPM & SPM/RSPM Ratio in Ambient Air of Agra:

The AAQM data at four monitoring stations has been analyzed and NRSPM (PM100-(minus) PM10) and SPM/RSPM Ratio has been calculated. In general, the concentration of NRSPM has decreased between year 2002 and 2011 while increasing

Figure 5.52 Trends of NRSPM & SPM/RSPM at Tajmahal

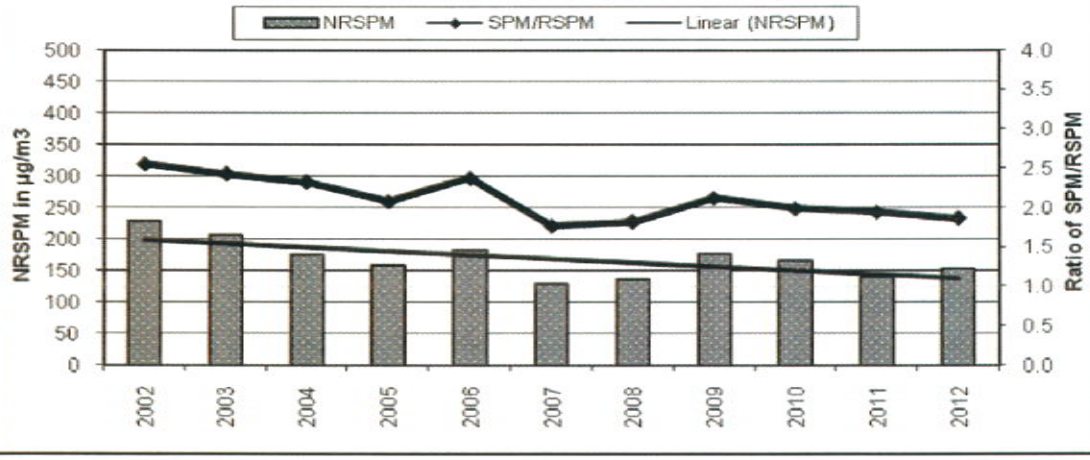
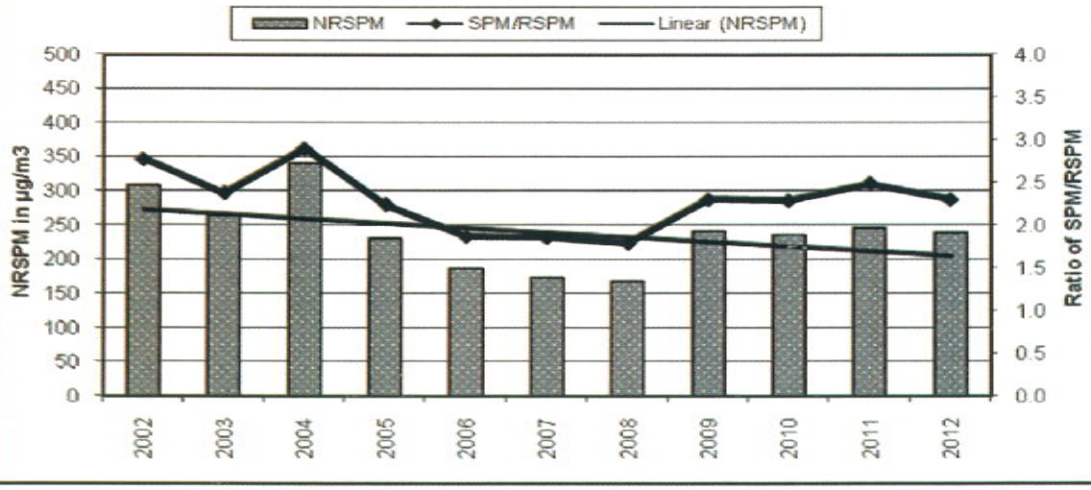


Figure 5.53 Trends of NRSPM & SPM/RSPM at Itmad-ud-daulah



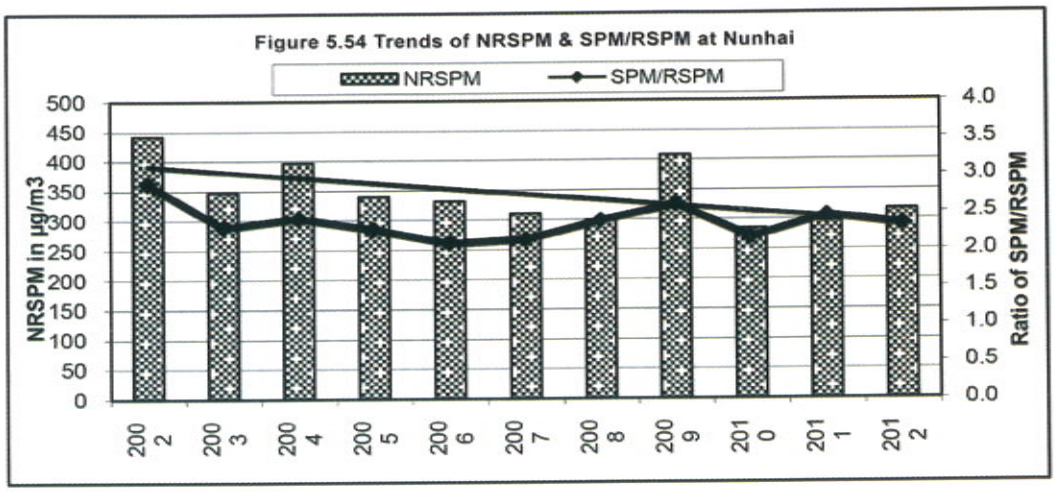


Figure 5.54 Trends of NRSPM & SPM/RSPM at Nunhai

trend observed during year 2012 at all air quality monitoring stations, but trends of SPM/RSPM ratio remained constant at Tajmahal & Rambagh while decreased at Itmad-ud-Daulah & Nunhai.

Yearly Trend of Air Quality in Agra (2002-2012):

There has been a slight decreasing trend in concentration of SPM since 2002 in ambient air at all monitoring stations at Agra. There was increasing trend observed in SPM & RSPM during the year 2012 in comparison to year 2011 at all stations. RSPM and SPM concentration levels exceeded the prescribed National Ambient Air Quality Standards for sensitive areas at all stations. The annual average concentration of SO2 and NO2 remained almost constant during the period at all locations and found within the Ambient Air Quality Standards except NO2 at Nunhai Monitoring station. The Tajmahal location remained the least polluted while Nunhai was the most polluted monitoring location with highest concentrations of pollutants in Agra.

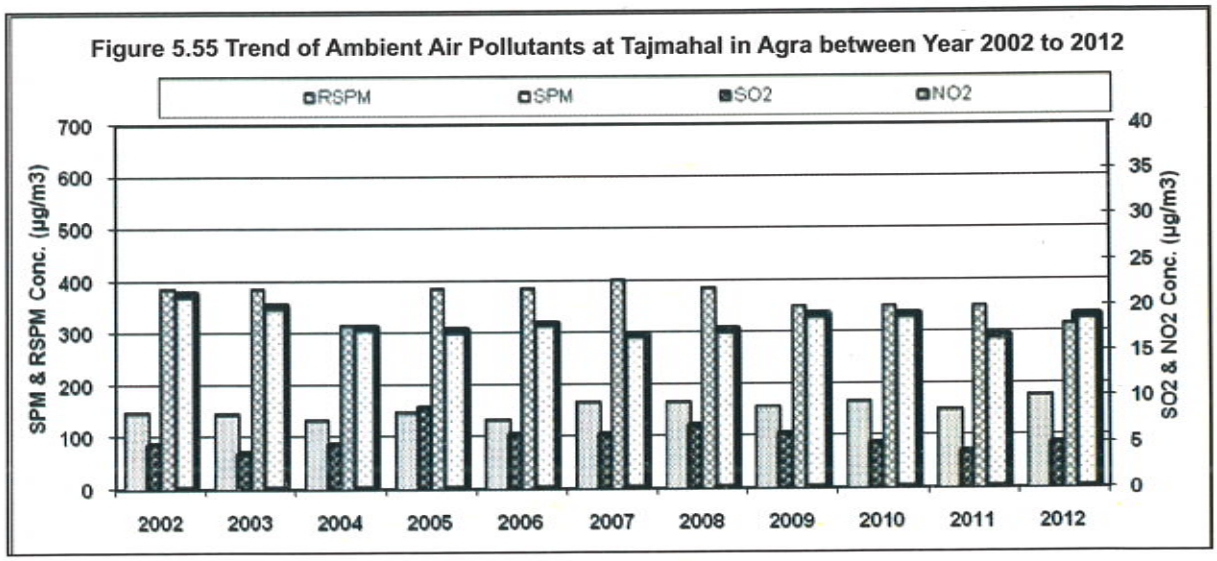


Figure 5.55 Trend of Ambient Air Pollutants at Tajmahal in Agra between Year 2002 to 2012

Figure 5.56 Trend of Ambient Air Pollutants at Etmaduddaulah in Agra between Year 2002 to 2012

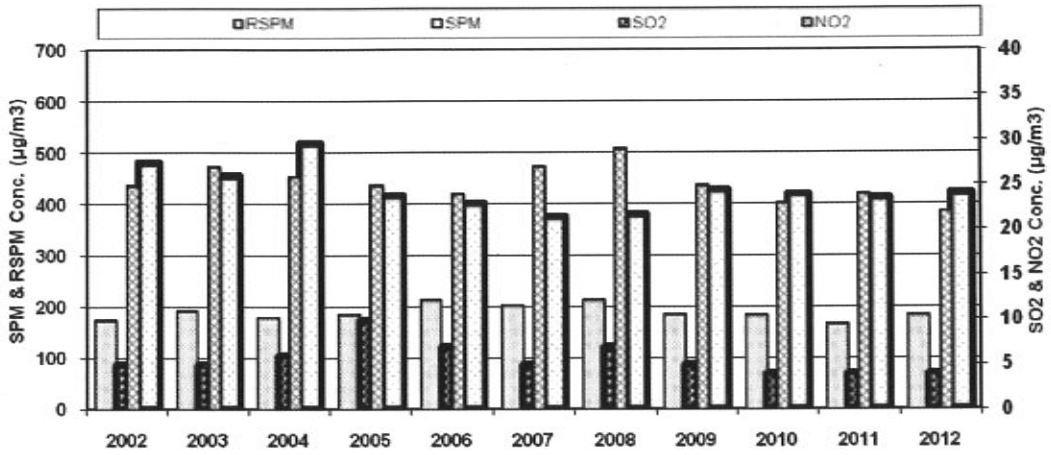


Figure 5.57 Trend of Ambient Air Pollutants at Rambagh in Agra between Year 2002 to 2012

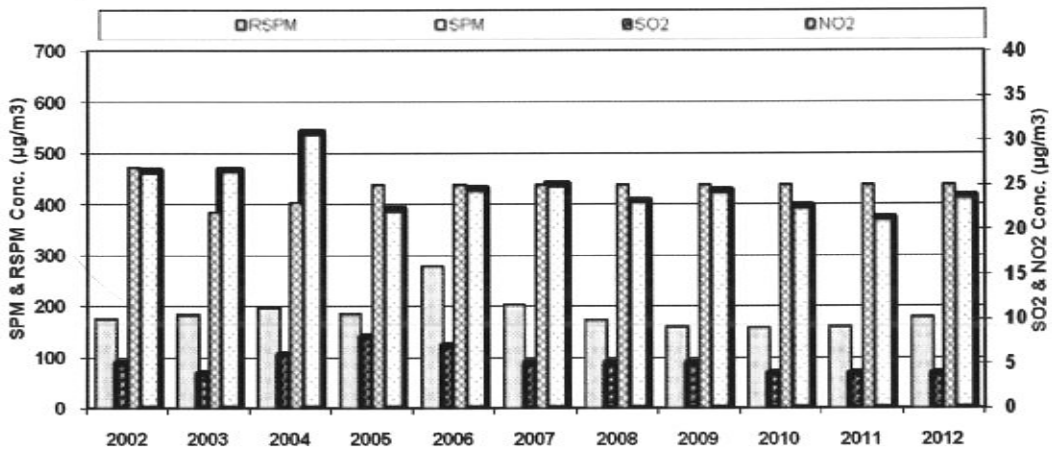
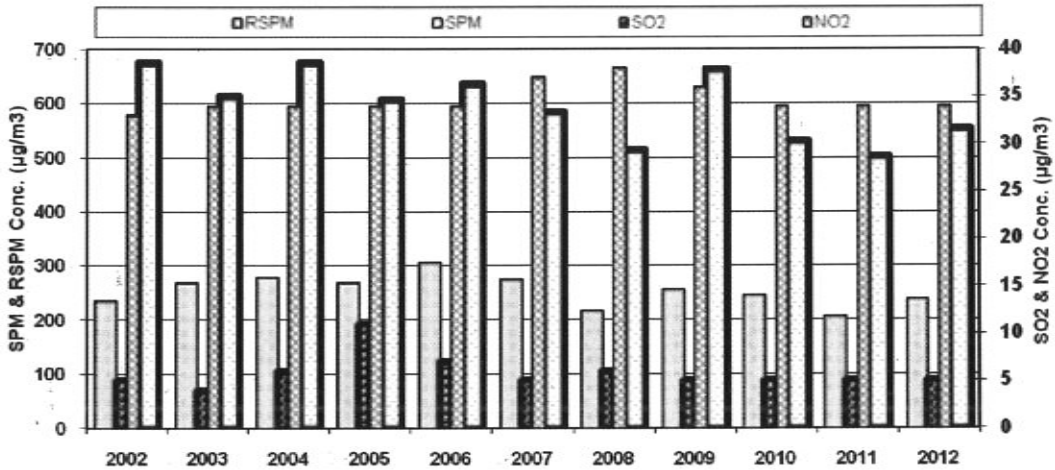


Figure 5.58 Trend of Ambient Air Pollutants at Nunhai in Agra between Year 2002 to 2012



Ionic Profile of RSPM:

Characterization of RSPM (PM10) has been carried out to assess its ionic composition and contribution in particulate matter. Ionic trend of PM10 at Agra during year 2012 has been presented in Table 5.18 and Figure 5.61. Anion concentration has been found higher during winter and least during rainy season. Na+ and Ca++ ions have found high during rainy and winter season.

Table 5.18 - Average of Cations & Anions in Ambient Air of Agra during year - 2012

Months	Na+	NH4+	K+	Ca++	Mg++	F-	Cl-	NO3-	SO4--
Jan	9.49	11.22	6.07	1.20	0.19	0.97	24.22	20.79	29.13
Feb	6.34	6.56	3.50	4.62	0.50	0.68	18.11	21.43	16.12
Mar	4.29	3.12	3.30	3.30	0.32	0.89	16.99	10.35	12.72
Apr	9.44	1.01	2.88	3.67	0.48	0.28	9.03	6.31	11.66
May	9.41	1.03	3.08	4.87	0.64	0.31	8.64	7.91	11.97
Jun	8.40	0.63	1.44	6.51	0.70	0.24	7.16	5.88	9.36
Jul	8.12	0.27	0.98	2.40	0.42	0.10	5.13	5.03	8.92
Aug	5.40	0.10	1.02	0.57	0.21	0.03	2.53	2.95	6.21
Sep	7.13	0.37	6.75	1.04	0.17	0.38	8.78	3.95	7.11
Oct	6.3	1.5	3.3	4.4	0.5	0.2	6.3	8.4	11.2
Nov	5.8	18.6	8.8	4.9	0.5	0.5	17.6	31.2	26.6
Dec	4.3	12.0	5.0	2.1	0.3	0.4	14.2	25.4	14.4

All values are in $\mu g/m^3$

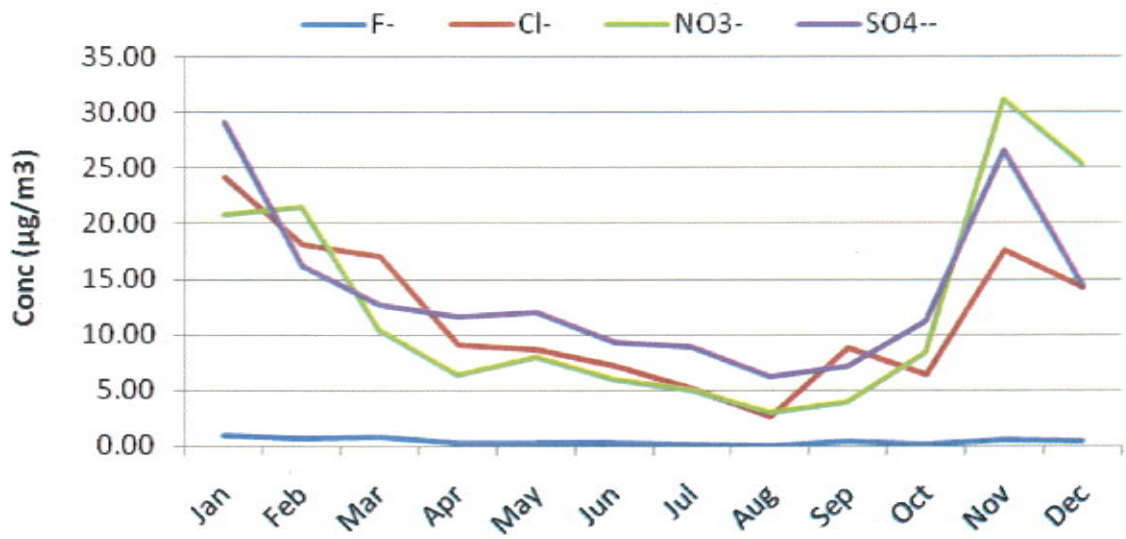


Figure 5.59 Concentration of Anions (in PM_{10}) in Agra City during year 2012

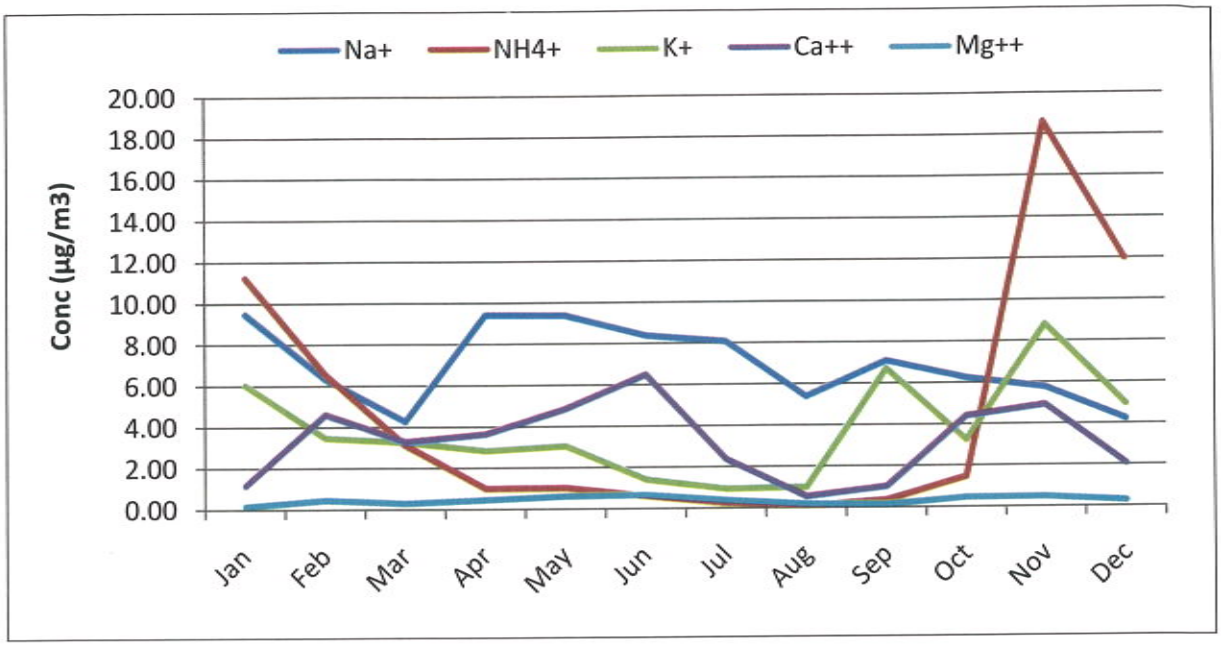


Figure 5.60 Concentration of Cations (in PM_{10}) in Agra City during year 2012

Ionic Trend of RSPM in Agra:

The ionic trend of RSPM at four monitoring stations at Agra has depicted in Figure 5.61. The decreasing trend of the cations in RSPM has been found as Na+ >NH4+ > K+ >Ca++ >Mg++ where as anions were found in the order SO_2-->NO_3->C_l->F-. The highest ionic concentration was observed at Nunhai industrial area.

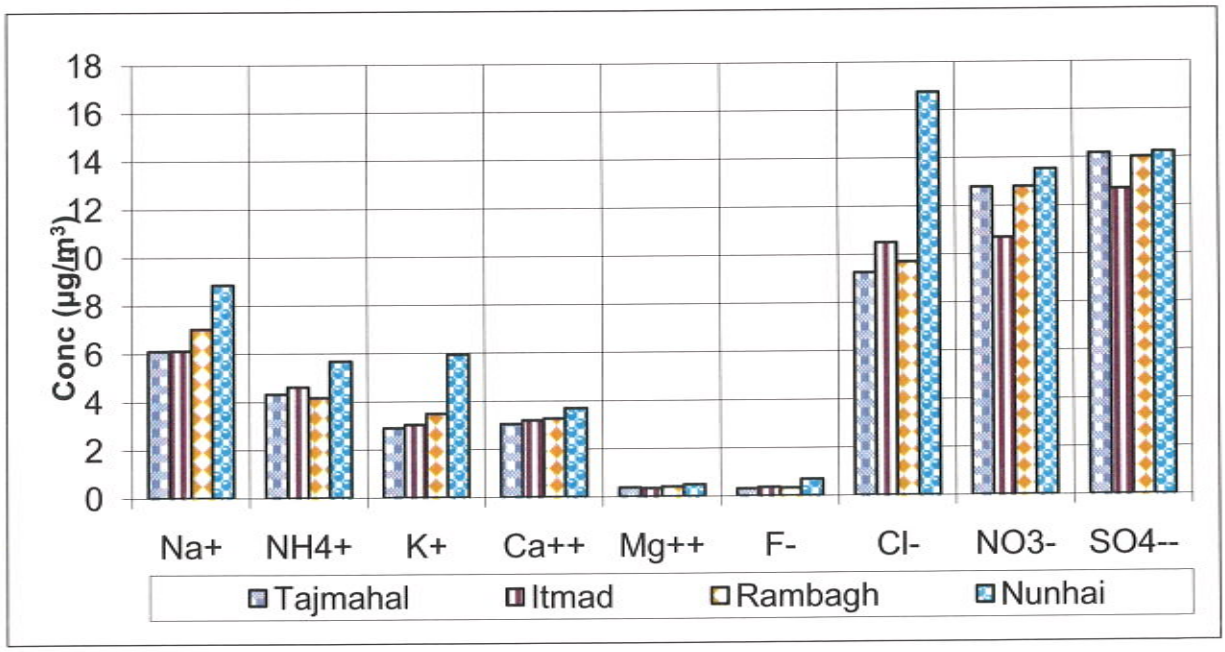


Figure 5.61 Ionic Trend of PM10 at Agra during year 2012

Contribution (%) of Ions in PM 10 at Agra:

The percentage contribution of ions in PM10 at Agra is presented in Figure 5.62. It has been observed that among anions the contribution of Cl-(19%) was highest and Flouride F-(1%) the least. Among cations the contribution of Na+ (18%) was the highest while and Mg++ (2%) least represented in PM10 at Agra.

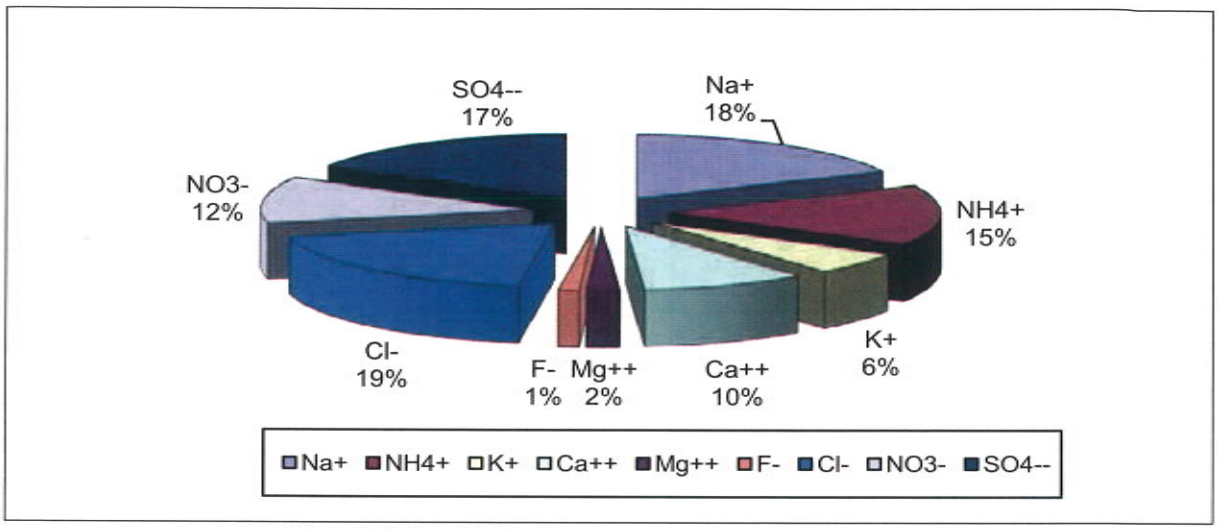


Figure 5.62 Contribution of Ions in PM10 at Agra during year 2012

Cation/Anion Ratio in RSPM (PM10) at Agra:

The cation to anion ratio of RSPM has been plotted and presented in Figure 5.63. The average ratios are slightly above 1 (1.09 to 1.19), which indicates that cations fraction slightly dominate as compared to anions fraction in particulate matter at Agra.

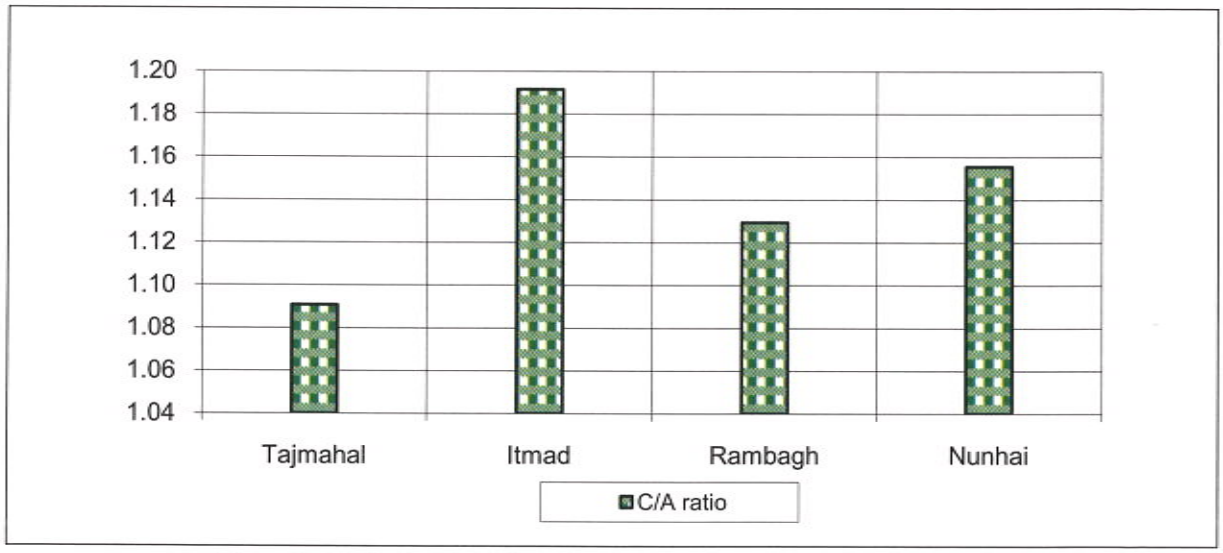


Figure 5.63 Cation/Anion ratio at various stations in Agra City during year 2012

Monthly Cation/ Anion ratio in PM10 at Agra :

The monthly cations to anion ratio of RSPM indicate that during winter months i.e. December to March Cation/Anion ratio was below 1.0, which clearly indicates that in the RSPM, Anions fraction dominated during these months while cations fraction dominated during rest of the year.

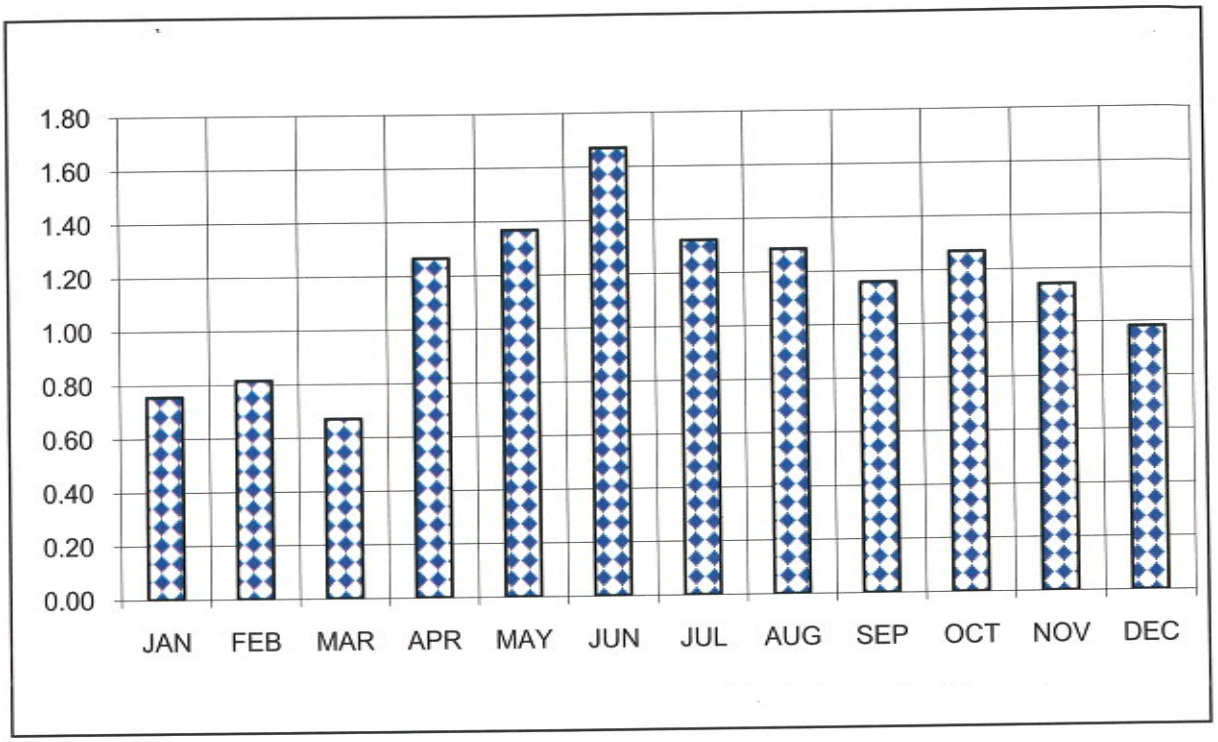


Figure 5.64 Monthly Cation to Anion Ration in PM_{10} during year 2012

5.2.14 Continuous Ambient Air Quality Monitoring at Bangalore & Chennai

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

The data generated at all six monitoring stations have been collected, validated and processed. The data generated/ data capture for Chennai has been 35 to 60 % while for Bangalore it was above 75%.

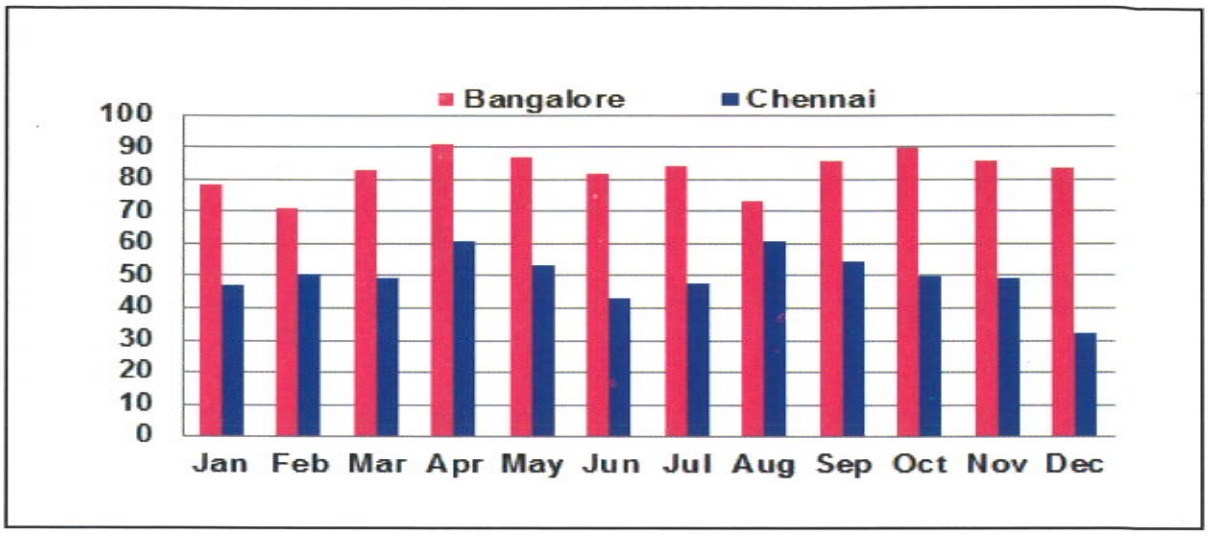
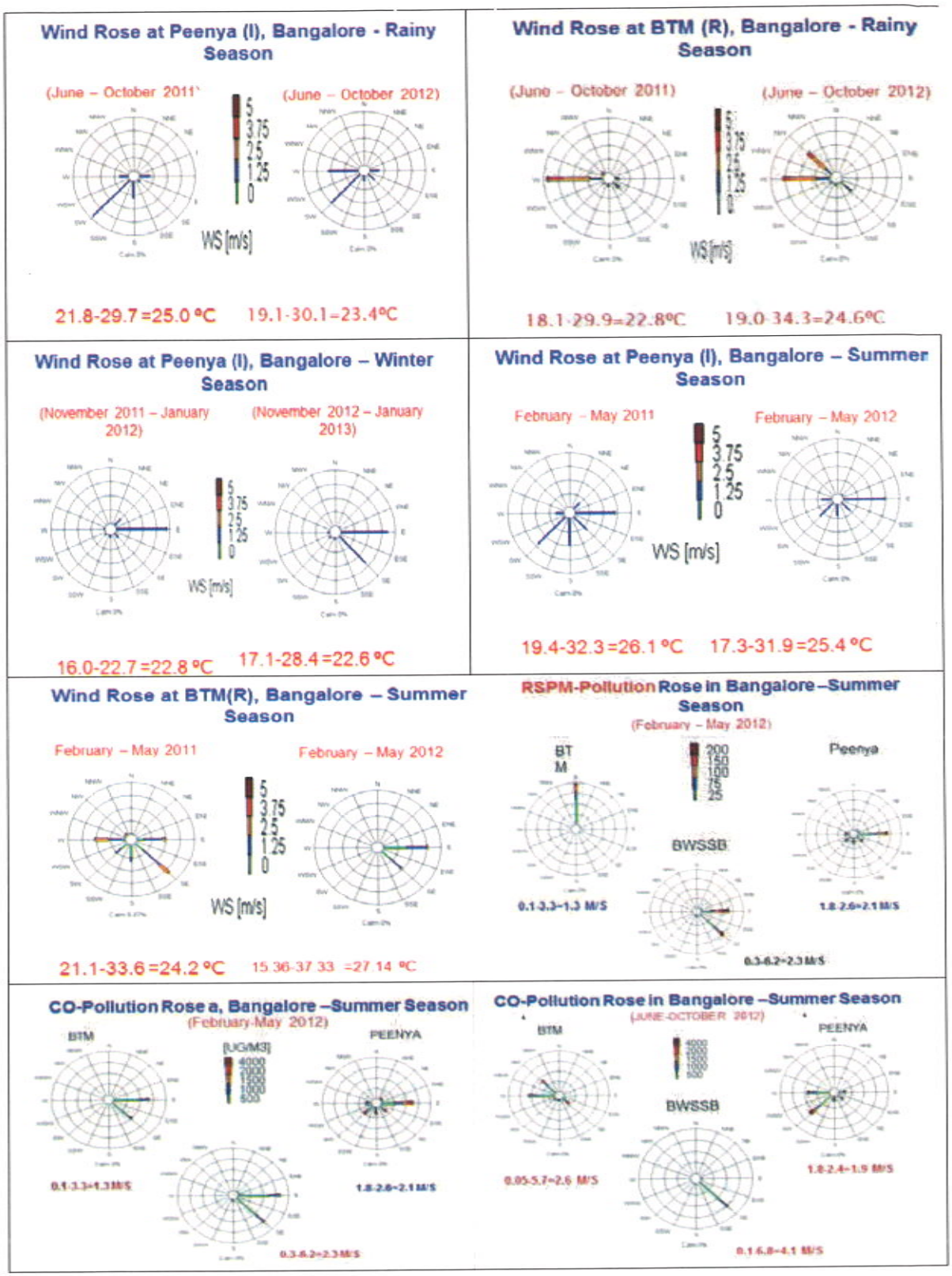


Figure 5.65 Percentage of Data Capture during year 2012 at Banglore & Chennai

Meteorological parameters such as wind speed, wind direction, temperature, humidity; pressure and radiation being measured at all monitoring stations both at Bangalore and Chennai. The wind rose plotted for various stations at Bangalore for the year 2011 and 2012 are presented in figure 5.66 to 5.73.



Figures 5.66 to 5.73

5.2.15 Ambient Air Quality at Kolkata

Central Pollution Control Board, Zonal Office Kolkata regularly monitors ambient air quality at South end Conclave Kasba area. The air quality is assessed for parameters like RSPM, SO2 & NOx. The generated data is telecasted daily. Monthly average of RSPM, SO2 & NOx observed during the year is presented in Table 5.19. The following are the salient findings:

- Monthly average values of RSPM ranged from 51.5 µg/ m3 to 355.6 µg/ m3.
- RSPM concentration was observed high during October to March.
- NOx concentration ranged from 10.6µg/ m3 to 63.5µg/ m3 which is much lower than air quality standard i.e. 80µg/ m3 (24 hour).
- SO2 concentration ranged from 1.6µg/ m3 to 23.2µg/ m3 which is much lower than air quality standard i.e. 80µg/ m3 (24 hour).
- RSPM has shown an increasing trend over the year. Reason for higher RSPM may be attributed to vehicular pollution, suspension of natural dust and construction of buildings in & around the monitoring locations.

Table 5.19 (Monthly Average of RSPM, SO2 & NOx) in Ambient Air at Kolkatta during year 2012-13

Month	RSPM (µg/m3	SO2 (µg/m3)	NOX (µg/m3)
	Average	Average	Average
April, 2012	86.7	3.4	12.6
May, 2012	95.9	1.6	11.7
June, 2012	79.8	2.5	11.2
July, 2012	51.5	2.0	10.6
August, 2012	70.1	1.6	14.1
September, 2012	79.8	2.6	23.7
October, 2012	116.9	6.6	30.6
November, 2012	157.1	9.2	58.2
December, 2012	230.4	9.7	63.5
January, 2013	328.6	13.0	41.9
February, 2013	355.6	23.2	35.9
March, 2013	123.1	9.6	20.0

5.2.16 Ambient Air Quality Monitoring During Deepawali 2012

DELHI

Ambient air quality is being monitored by Central Pollution Control Board during Deepawali for past many years and noted that during Deepawali days, the air quality deteriorates alarmingly due to the bursting of crackers.

In order to assess the air pollution caused due to bursting of crackers, ambient air quality was measured at various locations in Delhi. The comparative data of ambient air quality during Deepawali days in the year 2011 and year 2012 is presented in Table 5.20. The salient observations are as follows:

- Sulphur dioxide (SO2) levels have been found within the prescribed air quality standard of 80 µg/m3 at all the locations.
- Nitrogen dioxide (NO2) concentration on Deepawali day in the year 2012 increased at all the monitored locations as compared to Deepawali day in the year 2011. The NO2 levels have been within the prescribed standard of 80 µg/m3 at all locations except Pragati Maidan.
- Particulate matter (PM10) levels have shown an increasing trend at all the locations on Deepawali day, 2012 as compared to year 2011.

Table: 5.20 Ambient Air Quality At Various Locations in Delhi During Deepawali 2011 & 2012

Parameter	SO2 (µg/m3)		NO2 (µg/m3)		PM10 (µg/m3)	
Year	2011	2012	2011	2012	2011	2012
*Pragati Maidan/ ITO	28	13	56	85	416	795
Pitampura	22	17	27	58	428	776
Sirifort	25	19	30	67	635	760
Janakpuri	40	63	31	69	441	951
Nizamuddin	21	25	46	69	421	748
Shahazada Bagh	35	13	45	64	438	820
Shahdara	11	20	28	44	497	928
Concentration range	11-40	13-63	27-56	44-85	416-635	748-951
Ambient air quality standard (24 Hrs.)	80		80		100	
* Monitoring Station shifted from ITO to Pragati Maidan Metro Station during year 2012						

Agra

Central Pollution Control Board, Project Office, Agra has carried out Monitoring of Ambient Air Quality on Pre Deepawali (6th Nov., 2012) & Deepawali day (13th Nov., 2012) at two monitoring stations Etmad-ud-daulah (sensitive) & Tajmahal (sensitive). SO2 & NO2 have been found within the 24hr air quality standard but RSPM found above the standard.

The noise monitoring was also carried out at Nagala Paddi, (residential area) during Pre Deepawali (6th Nov., 2012, 6.00PM to 12.00AM) and on Deepawali day (13th Nov., 2012, 06.00PM to 12.00AM). The summary of Ambient Air Quality Monitoring & Noise Monitoring are presented in Table 5.21 to 5.23. Noise level have been found increased beyond permissible limit on both pre-deepawali day and deepawali day.

Table 5.21 Ambient Air Quality Monitoring 24 hrs average on pre-deepawali and deepawali day at Agra				
Date	**Monitoring Location**	**SO2 (µg/m$_3$)**	**NO2 (µg/m$_3$)**	**PM10 (µg/m$_3$)**
06.11.12 (pre-Deepawali)	Tajmahal	BDL	23	489
	Etmad-ud-daulah	BDL	34	538
13.11.12 (Deepawali)	Tajmahal	04	27	542
	Etmad-ud-daulah	BDL	28	519
	AAQM Std. 24hr)	80	80	100

Table 5.22 Noise monitoring on Pre Deepawali day (06.11.12) at Agra			
Time duration	**L_{eq} dB(A)**	**L_{max} dB(A)**	**L_{min} dB(A)**
18:00 Hrs. to 19:00 Hrs	56.1	96.6	42.5
19:00 Hrs. to 20:00 Hrs	50.9	74.9	43.6
20:00 Hrs. to 21:00 Hrs	52.0	69.5	45.2
21:00 Hrs. to 22:00 Hrs	52.1	75.7	45.1
22:00 Hrs. to 23:00 Hrs	49.6	78.9	40.0
23:00 Hrs. to 24:00 Hrs	45.9	66.8	40.1
Average L equivalent dB (A) (Between (18:00 to 24:00 hrs)			52.1
Lmax between (18:00 to 24:00 hrs)			96.6
Lmin between (18:00 to 24:00 hrs)			40.0
Noise limit for Residential Area, Day time (6.00AM-10.00PM) Leq.			55
Noise limit for Residential Area, Night time (10.00PM-6.00AM) Leq.			45

Table 5.23 Noise Monitoring on Deepawali day (13.11.12) at Agra			
Time duration	**L eq dB(A)**	**Lmax dB(A)**	**Lmin dB(A)**
18:00 Hrs. to 19:00 Hrs	61.6	93.3	41.3
19:00 Hrs. to 20:00 Hrs	68.1	101.3	44.8
20:00 Hrs. to 21:00 Hrs	75.9	101.7	50.0
21:00 Hrs. to 22:00 Hrs	78.1	102.3	53.6
22:00 Hrs. to 23:00 Hrs	77.4	102.1	51.2
23:00 Hrs. to 24:00 Hrs	72.0	101.0	43.1
Average L equivalent dB (A) (Between (18:00 to 24:00 hrs)			74.8
Lmax between (18:00 to 24:00 hrs)			102.3
Lmin between (18:00 to 24:00 hrs)			41.3
Noise limit for Residential Area, Day time (6.00AM-10.00PM) Leq.			55
Noise limit for Residential Area, Night time (10.00PM-6.00AM) Leq.			45

Vadodara

In order to assess the pollution load with respect to ambient air and noise, Central Pollution Control Board, Zonal Office Vadodara carried out monitoring for ambient air quality and Noise pollution at three prominent locations viz. Harinagar, MS University and Fatehgunj in Vadodara during Pre-Deepawali and Deepawali day for RSPM, SPM, SO2 and NOx.

Table 5.24 : Details of the monitoring locations for Ambient Noise & Air Quality during Deepawali 2012

Code	Station Name	Latitude	Longitude	Category
A	Fatehgunj	220 19'05".29	73 11 14.23	Commercial (Traffic Junction)
B	M S University Campus	220 18'42".01	73 11 05.06	Silent zone
C	Harinagar	220 18'35".19	73 09 12.31	Residential

The monitoring result are tabulated (below in Table 5.25 and graphically presented in Figure 5.74

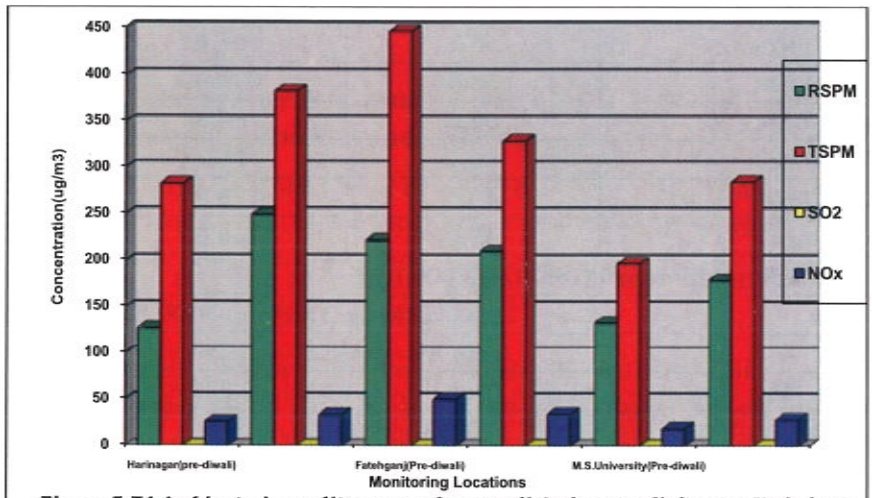


Figure 5.74 Ambient air quality on pre-deepawali & deepawali days at Vadodara

Table 5.25 : Ambient air quality monitoring on Pre-Deepawali day, Deepawali day at Vadodara, Gujarat

(A) Pre-Deepawali day

Station No & Name		Period	Time	RSPM	TSPM	Time	SO2	NOx
1.0	Hari Nagar Water tank, Vadodara	06.11.2012 to 07.11.2012	06.00 AM to 02.00 PM	118.63	245.4	06.00 AM to 10.00 AM	BDL	37.78
						10.00 AM to 02.00 PM	BDL	14.60
			02.00 PM to 10.00 PM	176.14	364.4	02.00 PM to 06.00 PM	BDL	23.60
						6.00 PM to 10.00 PM	BDL	38.67
			10.00 PM to 06.00 AM	86.45	237.4	10.00 PM to 02.00 AM	BDL	26.17
						02.00 AM to 06.00 AM	2.5	14.12
2.0	Fatehganj circle, Vadodara	06.11.2012 to 07.11.2012	06.00 AM to 02.00 PM	351.37	723.9	06.00 AM to 10.00 AM	BDL	80.70
						10.00 AM to 02.00 PM	BDL	38.23
			02.00 PM to 10.00 PM	167.63	374.9	02.00 PM to 06.00 PM	BDL	43.48
						6.00 PM to 10.00 PM	BDL	66.14
			10.00 PM to 06.00 AM	145.38	242.1	10.00 PM to 02.00 AM	BDL	36.81
						02.00 AM to 06.00 AM	BDL	35.0
3.0	M.S. University complex, Vadodara	06.11.2012 to 07.11.2012	06.00 AM to 02.00 PM	169.3	280.0	06.00 AM to 10.00 AM	BDL	9.19
						10.00 AM to 02.00 PM	BDL	8.23
			02.00 PM to 10.00 PM	125.54	174.0	02.00 PM to 06.00 PM	BDL	10.56
						6.00 PM to 10.00 PM	BDL	44.92
			10.00 PM to 06.00 AM	103.87	136.0	10.00 PM to 02.00 AM	BDL	17.27
						02.00 AM to 06.00 AM	BDL	19.19

(B) Deepawali day

Station No & Name		Period	Time	RSPM	TSPM	Time	SO2	NOx
1.0	Hari Nagar Water tank, Vadodara	13.11.2012 to 14.11.2012	06.00 AM to 02.00 PM	145.50	221.4	06.00 AM to 10.00 AM	BDL	33.50
						10.00 AM to 02.00 PM	BDL	15.52
			02.00 PM to 10.00 PM	308.29	531.6	02.00 PM to 06.00 PM	3.96	25.09
						6.00 PM to 10.00 PM	28.18	59.17
			10.00 PM to 06.00 AM	293.40	395.2	10.00 PM to 02.00 AM	30.84	41.60
						02.00 AM to 06.00 AM	(BDL)0.59	25.06
2.0	Fatehganj circle, Vadodara	13.11.2012 to 14.11.2012	06.00 AM to 02.00 PM	174.57	366.6	06.00 AM to 10.00 AM	BDL	35.67
						10.00 AM to 02.00 PM	BDL	19.82
			02.00 PM to 10.00 PM	160.51	257.3	02.00 PM to 06.00 PM	BDL	20.76
						6.00 PM to 10.00 PM	BDL	55.83
			10.00 PM to 06.00 AM	294.48	360.9	10.00 PM to 02.00 AM	10.12	46.10
						02.00 AM to 06.00 AM	BDL	25.57
3.0	M.S. University complex, Vadodara	13.11.2012 to 14.11.2012	06.00 AM to 02.00 PM	138.85	301.8	06.00 AM to 10.00 AM	BDL	28.56
						10.00 AM to 02.00 PM	BDL	7.74
			02.00 PM to 10.00 PM	141.57	219.6	02.00 PM to 06.00 PM	BDL	8.10
						6.00 PM to 10.00 PM	BDL (1.81)	47.36
			10.00 PM to 06.00 AM	255.85	331.3	10.00 PM to 02.00 AM	13.92	36.03
						02.00 AM to 06.00 AM	BDL (2.32)	41.96

Pre-Deepawali (24 Hrs Average results):

Stn No	Station Name	Period	Time	RSPM	TSPM	Time	SO2	NOx
1.	Hari Nagar Water tank, Vadodara	06.11.2012 to 07.11.2012	06.00 AM to 06.00 AM	127.1	282.4	06.00 AM to 06.00 AM	BDL	25.82
2.	Fatehganj circle, Vadodara	06.11.2012 to 07.11.2012	06.00 AM to 06.00 AM	221.5	446.97	06.00 AM to 06.00 AM	BDL	50.06
3.	M.S. University complex, Vadodara	06.11.2012 to 07.11.2012	06.00 AM to 06.00 AM	132.9	196.7	06.00 AM to 06.00 AM	BDL	18.23

Deepawali day (24 Hrs Average):

Stn No	Station Name	Period	Time	RSPM	TSPM	Time	SO2	NOx
1.	Hari Nagar Water tank, Vadodara	13.11.2012 to 14.11.2012	06.00 AM to 06.00 AM	249.1	382.7	06.00 AM to 06.00 AM	BDL	33.32
2.	Fatehganj circle, Vadodara	13.11.2012 to 14.11.2012	06.00 AM to 06.00 AM	209.9	328.3	06.00 AM to 06.00 AM	BDL	33.96
3.	M.S. University complex, Vadodara	13.11.2012 to 14.11.2012	06.00 AM to 06.00 AM	178.8	284.2	06.00 AM to 06.00 AM	BDL	28.29

Observations based on ambient air Quality Monitoring:

- The measured values for SO 2 at all the three monitoring locations have been found as BDL, the maximum value of NOx was recorded at Fatehgunj as 5.06 µg/m3, while minimum value observed at MSU as 18.23 µg/m3 during pre Deepawali day.
- During Deepawali day SO2 also observed as BDL at all locations. The maximum NOx observed as 33.96 µg/m3 at Fatehgunj and minimum at MSU as 28.29 µg/m3.
- The maximum value of RSPM was observed at Fatehgunj as 221.5 µg/m3 while minimum value observed as 127.1 µg/m3 at Harinagar during pre Deepawali period.
- During Deepawali day the maximum value of RSPM was observed at Harinagar as 249.1 µg/m3 while minimum as 178.9 µg/m3 at MSU.
- The maximum value of TSPM was observed at Fatehgunj as 446.97 µg/m3 and minimum at MSU as 196.7 µg/m3 during pre Deepawali day.
- During Deepawali day the maximum TSPM value was observed as 382.7 µg/m3 while minimum 284.2 µg/m3 at MSU.
- The results of ambient air with respect to RSPM and TSPM have been found exceeding the prescribed limits because of combined effect of bursting of crackers and heavy vehicular movement.

Table 5.26 Noise Levels Monitoring during pre-Deepawali and Deepawali Day in Vadodara

Location A-Fatehgunj	Pre-Deepawali Day (Normal Day)			Deepavali Day		
	Lmin	Lmax	Leq	Lmin	Lmax	Leq
18.00 to 19.00 Hr	70.0	87.0	76.0	68.0	88.0	74.2
19.00 to 20.00 Hr	68.0	92.0	79.0	67.0	89.0	77.6
20.00 to 21.00 Hr	68.0	86.0	76.4	58.0	90.0	77.5
21.00 to 22.00 Hr	71.0	93.0	82.9	68.0	97.0	85.5
22.00 to 23.00 Hr	55.0	101.0	84.0	67.0	90.0	76.5
23.00 to 24.00 Hr	61.0	92.0	76.6	67.0	99.0	81.2
Location B-M S University	**Pre-Deepawali Day (Normal Day)**			**Deepavali Day**		
	Lmin	**Lmax**	**Leq**	**Lmin**	**Lmax**	**Leq**
18.00 to 19.00 Hr	50.0	87.0	69.1	43.0	70.0	55.7
19.00 to 20.00 Hr	51.0	69.0	55.5	49.0	76.0	64.8
20.00 to 21.00 Hr	51.0	66.0	56.4	55.0	71.0	63.2
21.00 to 22.00 Hr	50.0	60.0	52.9	56.0	74.0	64.3
22.00 to 23.00 Hr	47.0	60.0	50.5	56.0	82.0	67.7
23.00 to 24.00 Hr	48.0	58.0	50.8	38.0	75.0	65.0

Location C-Harinagar	Pre-Deepawali Day (Normal Day)			Deepavali Day		
	Lmin	Lmax	Leq	Lmin	Lmax	Leq
18.00 to 19.00 Hr	64.0	91.0	77.5	60.0	80.0	69.9
19.00 to 20.00 Hr	55.0	77.0	67.1	60.0	86.0	72.1
20.00 to 21.00 Hr	51.0	78.0	65.4	62.0	85.0	73.9
21.00 to 22.00 Hr	47.0	84.0	67.0	68.0	93.0	80.2
22.00 to 23.00 Hr	48.0	76.0	60.9	74.0	99.0	86.8
23.00 to 24.00 Hr	45.0	87.0	70.0	62.0	97.0	84.9

The ambient noise level was high on both normal day and deepawali festival day. However there is a decrease in the Leq value at Fatehgunj, which may be due to lesser vehicular movement. But at Harinagar very high noise level was recorded during deepawali day which was due to the burning of fire crackers. The noise levels have been found exceeding the prescribed limits due to combined effect of heavy vehicular movement and bursting of crackers.

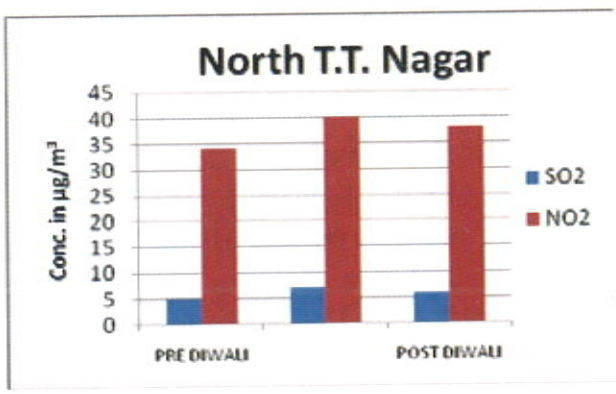
Bhopal

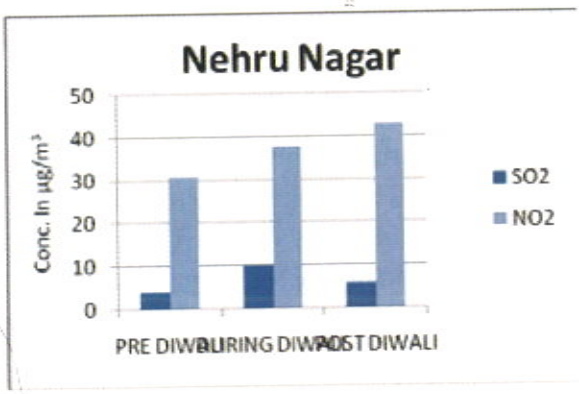
To assess the level of primary air pollutant and noise before, during and after Deepawali festival, Central Pollution Control Board, Zonal Office, Bhopal carried out monitoring at four locations i.e. Nehru Nagar, Chola Road, Saket Nagar and North T.T.Nagar at Bhopal. The values of RSPM was found in the ranges 190 to 430 µg/m3, the values of SO2 in the range 04 to 11 µg/m3 and the values of NO2 in the range 31 to 51 µg/m3 respectively. Ambient noise level was recorded in the range 59.58 to 83.63 dBA.

Table 5.27 : Ambient Air Quality Monitoring on Pre-Deepawali, Deepawali and Post-Deepawali day at Bhopal

Parameter	SO2			NO2			PM10		
Monitoring day	Pre Diwali	During Diwali	Post Diwali	Pre Diwali	During Diwali	Post Diwali	Pre Diwali	During Diwali	Post Diwali
Date	09.11.12	13.11.12	14.11.12	09.11.12	13.11.12	14.11.12	09.11.12	13.11.12	14.11.12
North T.T. Nagar	5	7	6	34	40	38	190	291	277
Nehru Nagar	4	10	6	31	48	43	252	389	294
Chhola Road	6	9	6	37	46	40	361	373	262
Saket Nagar	6	11	5	35	51	37	279	430	225

Note:All values are in µg/m3





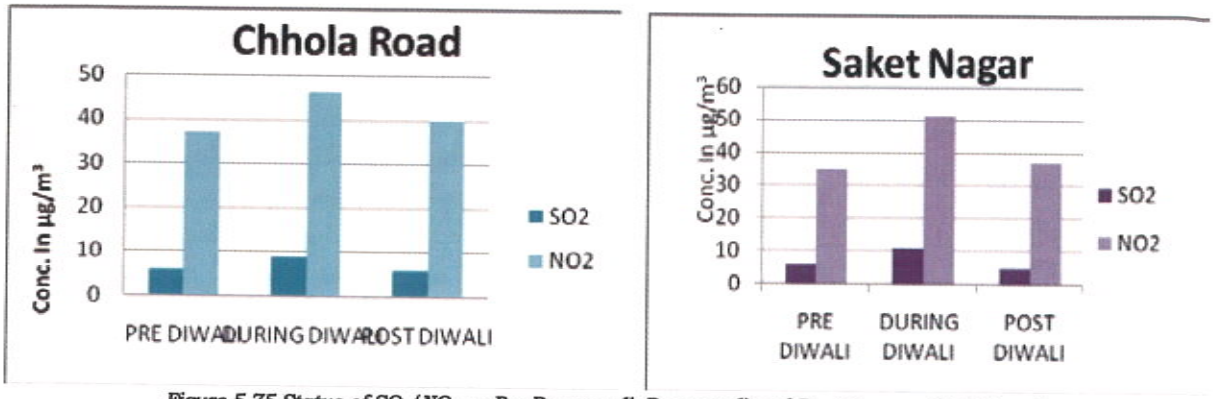


Figure 5.75 Status of SO_2/NO_2 on Pre-Deepawali, Deepawali and Post Deepawali at Bhopal

Bengaluru

The Ambient Air Quality and Noise level were monitored at Bengaluru by Central Pollution Control Board Zonal Office Bangalore and the results and depicted in Table 5.28 & 5.29.

Table 5.28 : Noise Level during normal day and Deepawali day at Bengaluru City

Locations	Normal Day (08.11.2012)			Deepawali day (13.11.2012)		
	L_{min}	L_{max}	L_{eq} dB(A)	L_{min}	L_{max}	L_{eq} dB(A)
Rajaji Nagar	44	89	59	58	108	80
Maleswaram	54	87	67	55	109	76
RT Nagar	57	86	66	68	100	75
Rammaiya Hospital	62	83	63	57	93	68

Table 5.29: Ambient Air Quality on normal day and Deepawali day at Bengaluru City

Location	8.11.2012 - 9.11.2012 (Normal day)			13.11.2012 - 14.11.2012 (Deepawali day)		
	SO_2	NO_2	PM_{10}	SO_2	NO_2	PM_{10}
Kurubarahalli	BDL	40	149	BDL	24	147
Nagar Bhavi	BDL	45	85	BDL	16	103
Rajaji Nagar	BDL	46	82	5	22	143
Ramaiya Hospital	BDL	48	101	BDL	25	153
RT Nagar	BDL	53	73	BDL	40	149
Air Quality Standard	80	80	100	80	80	100
All values are in Microgram per cubic meter (BDL for SO_2= 4, NO_2 = 9)						

5.3 National Ambient Noise Monitoring Network (NANMN) Programme

Central Pollution Control Board in association with State Pollution Control Boards established Real Time National Ambient Noise Monitoring Network by installing 35 Noise Monitoring Systems 05 at 07 metropolitan cities comprising Mumbai, Delhi, Kolkata, Chennai, Bangalore, Lucknow and Hyderabad (five stations at each city). Noise data generated from February 2011 to January, 2013 at seven Metropolitan cities reveals following findings :

Delhi

- Noise monitoring station at CPCB - HQs depicted sound level within the prescribed standards.
- Sound level always exceeded the limit at ITO Station, however all remaining four stations except CPCB-HQs exceeded the prescribed noise standard.

Lucknow

- Sound level at Talkatora Industrial Area was found within the prescribed standards, whereas noise level at Indira Nagar Station exceeded the standard during night time.
- Gomti Nagar, HajratGanj and SGPGI hospital stations exceeded the prescribed noise standard.

Kolkata

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

Mumbai

- All five stations exceeded the prescribed noise standards.

Hyderabad

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

Chennai

- Noise Monitoring Stations at all five locations namely Eye Hospital, Perambur, T.Nagar and Triplicane, Guindy exceeded the prescribed noise standard.

Bangalore

- Excedance of standards have been found for both day and night time at BTM and for day time at Nisarga Bhawan.
- Noise values at remaining four stations have been found within prescribed standard.

5.4 REAL-TIME POLLUTION MONITORING NETWORK AT CENTRAL POLLUTION CONTROL BOARD

A system for collecting online data on real time basis and publishing from 35 (Thirty five) continuous ambient air quality monitoring stations operated by various agencies such as CPCB, SPCB and industries is in operation. During the year, the concept of networking of different instruments in use for continuous air/water/ noise quality monitoring through-out the country by different agencies was introduced. Central Pollution Control Board presently receiving data from more than

200 stations in different formats and efforts are being made to bring all the data on a single platform for easy understanding and analysis.

The concept was materialized with the installation of central software operated by the major suppliers of instruments through installation of their own hardware & software. Through these systems, data collection is possible without human intervention and data analysis is made possible on real time basis. These portals are web based and uninterruptedly operational in separate specific domains, through which online data can be analysed. The physical data submission proposed to be discontinued in future and time gaps in data submission will be significantly reduced.

5.5 ENVIRONMENTAL DATA BANK

Web-enabled Environmental Data Bank has been set up to facilitate online entry and quick retrieval of data on various environmental parameters. On-line data entry of air quality under NAMP and water quality under NWMP is being updated on regular basis by SPCBs/PCCs. These data are made available through CPCB's website (http://cpcbedb.nic.in). EDB application is hosted at LNDC NICSI and remotely accessible at IT Division through VPN connection.

A proposal has been prepared to develop new EDB application to meet the present-day requirements of the users. The Expression of Interest (EOI) document including Scope of work for development of new EDB application is ready and in the coming year the software will take care of the user requirements on new platform and will take care of the migration of all the historical data under NAMP and NWMP. The physical records of Air Quality and Water Quality since inception of the Board will be converted and integrated with the present databases.

5.6 ESTABLISHMENT OF NATIONAL SPATIAL DATA INFRASTRUCTURE (NSDI) NODE AT CPCB

Central Pollution Control Board is a nodal agency, for environmental quality data (air, water, noise) and pollution data, of NSDI since April 2010. This project is sponsored by NSDI, DST and CPCB provides information/data on environmental quality in the desired format to NSDI for hosting on the India Geo-Portal.

A way forward document was prepared for establishing the node, preparation of Meta data, product catalogue and their uploading on the India Geo Portal of NSDI. The NSDI node at CPCB has been made functional during year 2012-2013. Meta Data format, for NAMP and NWMP data as per metadata standard version 2.0 of the NSDI, has been prepared.

Chapter VI

PRESENT STATE OF ENVIRONMENT, ENVIRONMENTAL PROBLEMS AND COUNTER MEASURES

6.1 MEASURES TAKEN FOR CONTROLLING AIR POLLUTION FROM INDUSTRIES

The measures taken for controlling air pollution from industries are as follows:

- Emission standards have been notified under the Environment (Protection) Act, 1986 to check pollution.
- Industries have been directed to install necessary pollution control equipment in a time bound manner and legal action has been initiated against the defaulting units.
- 24 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 has 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.

6.2 ACTION PLAN FOR THE 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 directed that action plan for pollution control in the cities, 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 including cities identified by the Hon'ble Supreme Court of India as well as other non-attainment cities identified for preparation of action plan for control of air pollution. CPCB is also reviewing and monitoring the implementation of the action plans prepared for these critically polluted and non-attainment cities. State Governments of the all the sixteen critically polluted cities have submitted their action plan for controlling air Pollution from all the major sources including industrial, vehicular & domestic sources.

6.3 CHARTER FOR CORPORATE RESPONSIBILITY FOR ENVIRONMENT PROTECTION (CREP) - STATUS OF DISTILLERIES

In 2003, the Charter on Corporate Responsibility for Environment Protection (CREP) was formulated in respect of major polluting industries, including distilleries, for compliance with the existing environmental standards in a time bound manner and for taking initiative to explore and adopt cleaner technologies and improve management practices to reduce pollution. CREP covers following options for spent wash effluent management at the distilleries :

i. Compost making with press mud/agricultural residue/Municipal Waste;

ii. Concentration and drying/ Incineration;

iii. Treatment of spent wash through biomethanation followed by two stage secondary treatment and dilution of the treated effluent with process water for irrigation as per norms prescribed by CPCB/MoEF;

iv. Treatment of spent wash through bio-methanation following by secondary treatment (BOD<2500 mg/I) for controlled discharge into sea through a proper submerged marine outfall at a point permitted by SPCB/CPCB in consultation with National Institute of Oceanography (NIO), so that Dissolved Oxygen in the mixing zone does not deplete, less than 4.0 mg/I;

v. One time controlled land application of treated effluent.

CPCB has been interacting with the State Pollution Control Boards/Pollution Control Committees for implementation of pollution control measures. As per information received from 26 State Pollution Control Boards/Pollution Control Committees, there are 339 distilleries. Of these, 250 distilleries have taken measures to achieve zero discharge of spent wash, 55 distilleries are yet to provide adequate measures to achieve zero discharge, 20 distilleries are closed and status of 14 distilleries are to be confirmed from the SPCBs/PCCs of Chhattisgarh, Jammu and Kashmir, Sikkim and Daman Diu Dadara Nagar Haveli. SPCBs/PCCs of Assam, Kerala, Nagaland, Tripura, Delhi and Pondicherry informed that there is no distillery within their jurisdiction.

Table 6.1: State-wise status of distilleries as on March 31, 2013

S. No.	State/ UT	No. of Distilleries	Operational Status/Pollution Control Measures			
			Distilleries with Zero discharge	Distilleries without Zero discharge	Distilleries Closed	Mode of zero discharge
1	Andhra Pradesh	19	18	01	00	RO/MEE, composting
2	Arunachal Pradesh	-	-	-	-	
3	Assam	0				
4	Bihar	05	05	00	00	Composting, irrigation
5	Chhattisgarh	03	--	--	--	---
6	Goa	02	00	02	00	---
7	Gujarat	10	09	01	00	Composting, irrigation
8	Haryana	08	08	00	00	MEE, composting
9	Himachal Pradesh	03	01	02	00	---
10	Jammu & Kashmir	06	--	--	--	---
11	Jharkhand	-	-	-	-	
12	Karnataka	38	37	01	00	
13	Kerala	0				
14	Madhya Pradesh	8	7	1		
15	Maharashtra	107	77	24	06	As per CREP
16	Manipur	-	-	-	-	
17	Meghalaya	-	-	-	-	
18	Mizoram	-	-	-	-	
19	Nagaland	0				
20	Orissa	04	04	00	00	---
21	Punjab	13	06	07	00	---
22	Rajasthan	10	09	00	01	MEE, RO, composting
23	Sikkim	01	--	--	--	---
24	Tamil Nadu	26	12	10	04	Composting, incineration
25	Tripura	0				
26	Uttar Pradesh	68	53	06	09	Composting, RO, MEE, Incineration, irrigation
27	Uttarakhand	03	03	00	00	Concentration, composting
28	West Bengal	01	01	00	00	---

S. No.	State/ UT	No. of Distilleries	Operational Status/Pollution Control Measures			
			Distilleries with Zero discharge	Distilleries without Zero discharge	Distilleries Closed	Mode of zero discharge
29	A & N Islands	-	-	-	-	
30	Chandigarh	-	-	-	-	
31	Daman Diu Dadra Nagar Haveli	04	--	--	--	---
32	Delhi	0	-	-	-	
33	Lakshadweep	-	-	-	-	
34	Puducherry	0	-	-	-	
	Total	**339**	**250**	**55**	**20**	

Note: Zero discharge- Zero discharge of spent wash into inland surface water
RO-Reverse osmosis
MEE-Multiple effect evaporation
CREP-Corporate Responsibly for Environment Protection

Composting and irrigation are being practiced in Bihar, Gujarat and Tamil Nadu. Concentration (RO, MEE) and composting are prevalent in Andhra Pradesh, Rajasthan, Punjab and Uttarakhand. In Uttar Pradesh, industries have provided measures including concentration (RO, MEE), composting, incineration and irrigation. Maharashtra Pollution Control Board has informed that measures as per CREP provided.

6.4 IMPLEMENTATION OF CHARTER FOR WATER RECYCLING AND POLLUTION PREVENTION IN PULP & PAPER INDUSTRIES IN FIVE IDENTIFIED CLUSTERS IN GANGA RIVER BASIN

Central Pollution Control Board(CPCB) has carried out extensive consultations beginning in April, 2012 with various stake holders viz. Central Pulp & Paper Research Institute (CPPRI), Saharanpur, Department of Paper Technology, IIT, Roorkee, Uttarakhand Environment Protection and Pollution Control Board (UEPPCB), Uttar Pradesh Pollution Control Board,(UPPCB) and local Paper Industry Associations culminating in June, 2012 with a detail implementation programme of about eight months duration for implementation of the Charter in five identified clusters of Pulp & Paper industries located in the catchments of Ramganga and Kali rivers.

The implementation programme was also discussed on 29th June, 2012 at Central Pollution Control Board with the Mission Director (NMCG), Ministry of Environment & Forests (MoEF), Joint Secretary (CP Division), MoEF, Director, CPPRI, Member Secretaries of UEPPCB and UPPCB and Pulp & Paper Mills Associations representing the identified clusters.

Central Pollution Control Board issued directions on July 12, 2012 under section 18(1)(b) of the Water (Prevention and Control of Pollution) Act, 1974 to UEPPCB

and UPPCB for implementation of the Charter. Accordingly, UEPPCB and UPPCB also issued directions under section 33(A) of the Water (Prevention and Control of Pollution) Act, 1974 to 84 identified Pulp & Paper industries located in the five clusters, viz. Kashipur and Roorkee in Uttarakhand and Muzaffarnagar, Meerut and Moradabad in Uttar Pradesh have consented to implement the Charter as per the detailed programme.

The 'Charter for Water Recycling and Pollution Prevention in Pulp and Paper Industries in Ganga River Basin' is under implementation by 84 Pulp & Paper industries located in five identified clusters namely Kashipur and Roorkee in Uttarakhand and Muzaffarnagar, Meerut and Moradabad in Uttar Pradesh since August, 2012. The duration of the implementation programme was up to March 31, 2013.

Selection of Pulp & Paper Mills Clusters

Ramganga and East Kali, the major tributaries of river Ganga in the stretch Uttarakhand and upper reaches of Uttar Pradesh is largely affected by industrial effluent from Pulp & Paper mills located in Kashipur, Moradabad and Meerut (Village Saini, Meerut-Mawana Road) clusters. Similarly, West Kali, a tributary of river Hindon is largely affected by industrial effluent from Pulp & Paper mills located in Roorkee and Muzaffarnagar (Bhopa & Jansath Road) clusters. The major rivulets transporting industrial effluents from Pulp & paper mills to river Ramganga are Dhella, Bahella, Kosi, Pilakhar, Kalyani, Baigul and Gola. River East Kali meets river Ganga a few kilometres after the confluence of rivers Ganga and Ramganga at Kannauj, and further degrades water quality of the river Ganga.

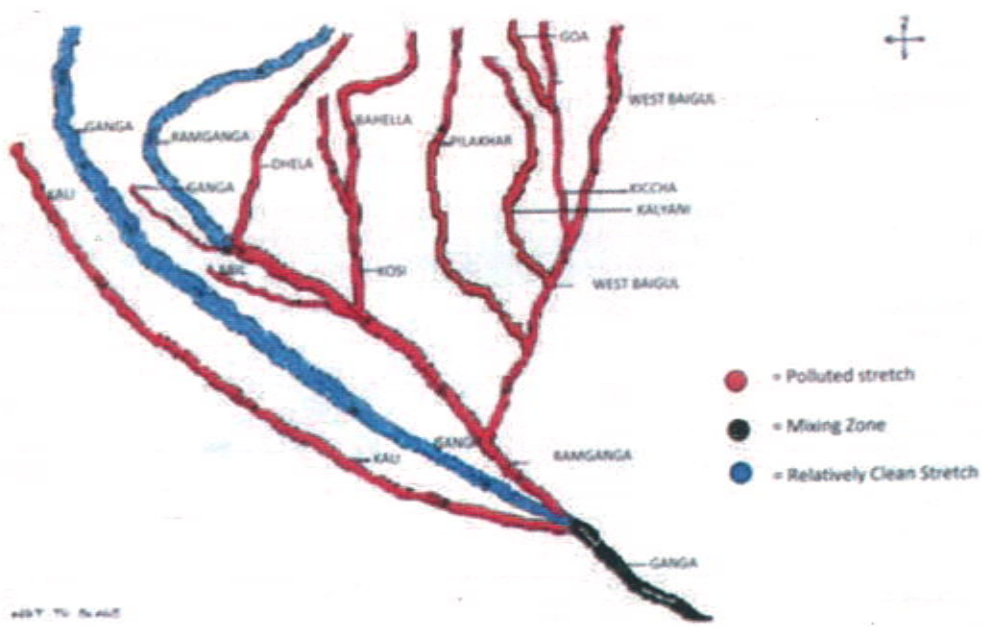


Figure 6.1: Major Rivulets / Tributaries of Uttar Pradesh & Uttrakhand contributing Pollution into River Ganga

The pulp and paper mills located in these river basins were grouped into five clusters as indicated in Table- 6.2

Table 6.2: Identified Pulp & Paper Mill Clusters in River Ganga Basin

Cluster	Number of Pulp & Paper Mills
• **Uttar Pradesh**	
• **Muzaffarnagar**	**32**
• **Meerut**	**13**
• **Moradabad**	**5**
• **Uttrakhand**	
• **Kashipur**	**29**
• **Roorkee**	**5**
Total	**84**

The Pulp & Paper mills located in these clusters were classified into four categories, namely :

- Agro Based Writing & Printing paper mills (A1),
- Agro Based Kraft paper mills (A2),
- RCF Based Writing & printing paper, Duplex board, newsprint (B1) and
- RCF based Kraft paper mills (B2).

The Charter focused on the following major areas:

(I) Formulation of Water Consumption & Discharge Norms

As an initial step, water consumption and waste water discharge norms to be achieved within specific time frame, were formulated for different categories of Pulp & Paper mills (Table 6.3 & 6.4). These norms were based on Best Available Technology and Best Achieved Level in the Paper Industry.

Table 6.3. Proposed Fresh Water Requirement Norms

Category	Short Term Targets m3 / t paper (Average)	Medium Term Targets m3 /t paper (Average)	Long Term Targets m3 /t paper (Average)
A1: Agro Based Writing & printing paper mills	100	80	60
A2: Agro Based Kraft paper mills	75	60	40
B1: RCF Based Writing & printing paper, Duplex board, newsprint	50	40	20
B2: RCF based Kraft paper mills	35	25	15

Table -6.4 Proposed Waste Water Discharge Norms

Category	Short Term Targets m3 / t paper (Average)	Medium Term Targets m3 /t paper (Average)	Long Term Targets m3 /t paper (Average)
A1: Agro Based *Writing & printing paper mills*	80	65	50
A2: Agro Based *Kraft paper mills*	70	50	30
B1: RCF Based *Writing & printing paper, Duplex board, newsprint*	40	35	15
B2: RCF based *Kraft paper mills*	30	20	10

The discharge norms for various pollutional parameters were also evolved for the Pulp & Paper mills located in River Ganga basin as indicated in Table 6.5

Table 6.5 Proposed Treated Effluent Quality Norms

Parameters	Mill producing Chemical Pulp	RCF based Mills
pH	6.5-8.5	6.5-8.5
TSS,mg/l	< 50	< 50
TDS, mg/l	< 2100	< 2100
COD, mg/l	< 250	< 225
BOD , mg/l	< 30	< 30
Colour , PCU	< 500	< 250

(II) Fresh Water Conservation

Under fresh water conservation, following strategies were recommended :

- Installation of calibrated flow meter device at bore well and distribution pipe lines
- Availability of fresh water reservoir
- Installation of flow meter at ETP discharge or availability of calibrated V notch
- Replacement of existing fresh water showers with new efficient showers of specified diameter
- Increased reuse / recycle of back water / treated effluent
- Installation of fiber recovery units like Krofta / Sedi Cell/ Poly disc filter
- Color coding of fresh water , back water , treated effluent return sludge etc for proper identification

(III) Process Upgradation

Under process up gradation, following best practices were recommended for reducing water consumption and improvement of overall environmental status :

- Availability of Wet Washing System
- Adoption of efficient black liquor extraction system like screw press / belt press/ vacuum , pressure or diffuser washer
- Oxygen Delignification + with Elemental Chlorine bleaching (conventional bleaching) or ECF bleaching for agro based mills producing bleached grade of paper
- Installation of Chemical Recovery Plant or Common Chemical Recovery plant – conventional soda recovery or FBR system
- Floatation deinking with disperser for RCF based Mills manufacturing bleached grade paper
- Adoption of Hi- consistency pulpers (for waste paper based mills)

(IV) ETP Upgradation

Since almost all the mills were having ETP facility, but most of them were facing problems of environmental non-compliance. Looking into the reasons, following minimum requirements were recommended in the CREP to improve the environmental compliance of the Pulp & Paper mills in these clusters :

- Adequacy assessment of existing ETP in terms of existing production capacity and effluent load generated
- Provision of equalisation tank to check shock loads to ETP
- Construction / Upgradation of Primary Clarifier to achieve Suspended Solid level < 200 mg/l
- Availability of adequate aeration in aeration tank through surface / diffused aeration
- Development of MLSS level (2000- 3000 mg/l)
- Installation of tertiary treatment system (Pressure Sand Filter/ Dual Media Filter/ Activated Carbon Filter/ Micron Filter / Spray Filter etc)
- Provision of separate electricity meter at ETP
- Availability of ETP lab facility with trained manpower and equipments
- Creation of Environment Management Cell (EMC)
- Training of ETP personnel on basic & fundamentals of ETP operation

(V) Documentation

The basic aim of documentation was to help both the mills as well as regulatory authorities in monitoring the performance of ETP on regular basis

- • Maintenance of log books for daily recording of :
  - Fresh Water Consumption
  - Waste Water Discharge

- Energy Consumption in ETP
- Chemical consumption in ETP
- Waste Water Analysis

Table 6.6 CHARTER IMPLEMENTATION SCHEDULE

Targets	Objective	Major Focus
Short Term targets (by July 31, 2012)	Involve standardisation of process & ETP Operation	• Segregation, collection & reuse of back water in the same loop • Replacement of Paper machine showers with efficient showers • Proper O & M of ETPs and their performance assessment
Medium Term Targets (by September 30, 2012)	Reduction in wastewater generation and improved environmental compliance	• Wet washing of Raw Material • Installation of efficient black liquor system • Installation of efficient fiber recovery system • Effective collection of black liquor spills for processing through CRP • Condensate collection and reuse,recycle vacuum pump sealing water • ETPs capacity augmentation
Long Term Targets (by December 31, 2013)	Water recycling and pollution prevention	Compliance with the prescribed long term norms
By March 31, 2013	Process technology upgradation	Process upgradation like ODL/ ECF bleaching , tertiary treatment system, etc

Detailed Implementation Programme of Charter

To ensure effective implementation of the Charter, a time bound Detailed Implementation Programme (DIP) was evolved with specific responsibilities to the major stake holders viz individual industry, local industry associations, CPPRI, UEPPCB, UPPCB and CPCB as indicated in Table 6.7 (a) to 6.7 (d).

Table6.7(a) Action Plan for Implementation of Technological & Process Improvements

Activities	Action By	Time
Self Assessment: Inventory of existing process technologies & practices, identification of upgradation requirement and preparation of action plan for upgradation, including setting up of CRP/ CCRP with supporting document & pert chart	Pulp & Paper Mills / consultants	15 Days
Third Party auditing & monitoring: Evaluation/ validation of the reports on inventory, up-gradation requirements and action plan	CPPRI	One Month
Implementation of action plan envisaged as per document of individual mills	Pulp & Paper Mills	By Dec. 31, 2012
Submission of monthly progress reports to mill associations for onward submission to CPPRI	Pulp & Paper Mills	Monthly
Verification of progress	CPPRI	Bi -monthly
Regulatory review: Verification of the progress	CPCB/ SPCB	Quarterly

Table 6.7 (b) Action Plan for Implementation of Water Conservation & Water Recycling

Activities	Action By	Time
Installation of sealed flow meter and running hours meter on bore wells and inlet pipe line of different process section i.e. pulp mill, paper machine , boiler etc	Mils	One Month
Installation of online flow meter/ V notch to monitor final effluent discharge	Mills	One Month
Colour coding of pipe lines carrying recycled process water and fresh process water	Mills	Three Month
Provision of water reservoir and supply of process water from reservoir only	Mills	Three Month
Maintenance of log book to record daily water drawl from borewell and water consumption unit wise	Mills	Daily basis
Self Assessment: Preparation of report of existing water consumption-section wise, reuse/ recycle practices; Preparation of work plan to achieve fresh water requirement targets	Mill Expert / Consultant	15 days
Third party auditing & monitoring: Evaluation/ validation of the work plan for implementation of water consumption standards	CPPRI	One Month
Implementation of action plan	Mills	By Dec 31, 2012
Submission of progress reports	Mills	Monthly
Verification of the progress	CPPRI	Bi – monthly
Regulatory review: Verification of the progress	CPCB / SPCB	Quarterly

Table 6.7 (c) Action Plan for Assessment, Augmentation And Upgradation of ETPs

Activities	Action By	Time
Preparation of panel of qualified and reputed experts	Local Paper Mill Association	15 Days
Self Assessment: Preparation of ETP adequacy assessment report; and proposed augmentation and up-gradation plan, design/drawing, along with monthly PERT Chart	Expert / Mill	One Month
Third Party auditing & monitoring: Evaluation/ validation of adequacy, and proposed augmentation/ up-gradation plan, design/ drawings	CPPRI	45 days
Submission of monthly progress report to CPPRI through mill associations	Mills	Monthly
Verification of the progress	CPPRI	Bi – monthly
Regulatory review: Verification of the progress	CPCB / SPCB	Quarterly
Complete implementation of Charter	Mills	By December31, 2012

Table 6.7 (d) Action Plan for Monitoring & Surveillance of Environmental Compliance

Activities	Action By	Time
Self Monitoring & Reporting:		
ETP performance monitoring by individual Mills and maintenance of Log Book as per the prescribed format	Mils	Daily
Submission of the report of individual mill to CPPRI through Association on fortnightly basis	Mill Associations	Fortnightly
Third Party Monitoring & Reporting: Waste Water samples collection & analysis - Mills (ETP) - Drains/rivers		
Review meetings of Mills, empanelled experts, Association, CPPRI & SPCBs/ CPCB to help mills to improve ETP performance & sample analysis quality	CPPRI	Bi- monthly
Regulatory Monitoring: Quarterly surprise/ joint monitoring and review meetings	CPCB/SPCBs/ CPPRI	Quarterly
Dismantling of digesters/ pulp washing lines, etc. in agro based mills not able to submit action plan for CRPs/ CCRPs with adequate supporting documents within 45 days	CPCB / SPCB	45 days
Organisation of training programmes on process technology, best practices, ETP operation & maintenance, Sample analysis etc	CPCB / SPCB / CPPRI	Periodically

Benefits / Impact of Charter Implementation

Majority of the pulp and paper mills in Kashipur, Roorkee, Muzaffarnagar , Meerut & Moradabad have made significant progress in implementing the Charter as per the Detailed Implementation Programme. The benefits observed/ estimated due to Charter implementation in terms of water conservation, reduction in pollution load and overall improvement in environmental status are summarized as under :

(a) Reduction in Fresh Water Consumption

The pulp and paper, mills are considered to be water intensive industry and water consumption in these mills in general varies between 60-125 m^3/t paper. The volume of water consumption varies depending on process operations, raw material used, end product quality.

In context of the existing waste water discharge standards for RCF & Agro based Mills, around 60-70 % reduction in waste water discharge and equally in water consumption is expected to be achieved after achieving Charter targets through Process Upgradation.

It is estimated that overall about 17000 m3/day (6000 Million Liters per year) of fresh water (ground water) will be conserved by the paper mills in these clusters due to implementation of Charter with water conservation and wastewater recycling.

The mills have either reduced or in process to reduce water consumption as per Charter Norms through process upgradation, reuse/ recycle of back water , treated effluent etc .

Process Upgradation

- By replacement of paper machine showers by specified diameter nozzle showers, the mills have been able to achieve 5 - 10% reduction in fresh water consumption.
- Similarly installation of screw, twin drum washer etc. will help in reducing water consumption in pulp washing by agro based mills
- With hi- con pulper, the RCF based mills will be able to carry out pulping at high consistency (12-15 %) as compared to 6-8 % with conventional hydrapulper , thus reducing water consumption

Reuse & Recycle of Backwater / Treated Effluent

- With the installation / upgradation of the fiber recovery units like DAF , Sedicell, Poly disc filter , Save all etc in most of the RCF based mills , the extent of recycling of back water has increased significantly along with added advantage of fiber recovery which has made a positive impact on the overall economics of the paper production of the mills.
- Since many of the mills are in advanced stages of upgrading their wastewater treatment plants and also installation of tertiary treatment units such as sand filters, multi-grade filters and clari-flocculator, the overall quality of the treated wastewater quality will be improved further, which will further enhance the wastewater recycling opportunity and thus reduce fresh water consumption in respective mills.
- The existing water conservation levels achieved in each of the cluster is shown in Figure 6.2

The level of fresh water consumption is expected to further go down once all the projects under the charter implemented fully.

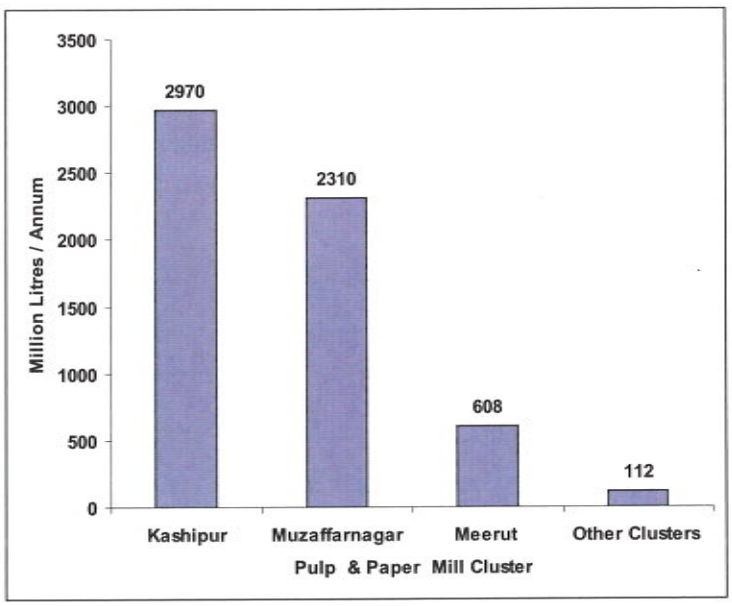


Fig 6.2 Reduction in Fresh Water Consumption in Selected Clusters

(b) Sustainability of Agro Based Mills

With the installation of oxygen delignification system and

chemical recovery the agro based mills which are on verge of closure will get a new lease of life and will be able to continue the operations in environmentally sustainable way, Oxygen Delignification

- With the installation of Oxygen Delignification system by agro based paper mills producing writing and printing grade of paper, the kappa no and consequently chlorine consumption is expected to be reduced by 40-50% consequently leading to significant reduction in pollution load accordingly as indicated in Table 6.8

Table 6.8 Reduction in Pollution load due to Oxygen Delignification System

Total capacity of agro based writing and printing paper in the region (Kashipur, Mooradabad, Meerut, Muzaffarnagar)	1000 tpd
Avg. kappa number	16
Chlorine demand (kappa no. x kappa factor -0.25)	4%
Chlorine Demand	40 tpd
Avg Kappa number after installing ODL	8
Estimated chlorine demand	20 tpd
Accrued benefit	
There shall be other benefits in terms of energy recovery as filtrate from ODL can go to recovery plant as opposed to filtrated from bleaching section	

Biomass Recovery

- The significant impact of the charter would be the increase in percentage share of agro-based paper production in the clusters due to installation of chemical recovery system. The chemical recovery system will not only help in recovery of energy and chemicals from (biomass) through incineration but also reduce pollution load due to black liquor. This would lead to improved environmental compliance as well as cost economics of paper paper production.
- It is estimated that before the closure of agro based units without chemical recovery system, there was the potential of discharge of around 550 tpd COD in the river Ganga. After the implementation of the charter, the clusters can add 1200 tpd production capacity without adding pollution load **(Table 6.9)**

Table 6.9 Impact of setting up of Chemical Recovery in Agro based Mills of Selected Cluster

Total installed capacity of agro based industry without chemical recovery unit in the region (Kashipur, Moradabad, Meerut, Muzaffarnagar), tpd	1200
Black Liquor Generation , m3/d	18000
Avg COD concentration in black liquor ,mg/l	30,000
Potential COD load reduction after installation of recovery unit, tpd	550
Avg. BOD concentration in black liquor, mg/l	10,000
Potential BOD load reduction after installation of recovery unit, tpd	185

- It has been estimated that due to implementation of the chemical recovery

plants, the overall Chemical Oxygen Demand (COD) discharge into the recipient river systems would be reduced by an order of 40 to 50% from the levels reported prior to implementation of the Charter.

(c) Reduction in Pollution Load

The benefits of water conservation, process and ETP upgradation are likely to be reflected in terms of reduction in waste water discharge as well as pollution load. The results of initial studies confirm this aspect.

Reduction in Volume of Waste Water Discharge

- Around 35 % reduction in waste water discharge has been estimated during the course of implementation of the Charter as indicated in Table 6.10 & Figures 6.3 & 6.4

Table 6.10 Reduction in Wastewater Discharge into Rivers

Sector	Wastewater Discharged into Respective Rivers (m3/day)		Reduction in Wastewater Discharge due to Implementation of Charter (m3/day)	Percent Reduction from baseline levels (%)
	Before Charter Implementation -Year - 2011	Charter being implemented (as on December 2012)		
Kashipur	58000	38000	20000	34
Muzaffarnagar	38000	25000	13000	34
Meerut	21000	12000	9000	43
Other clusters	2525	2200	325	13
Total	119525	77200	42325	35

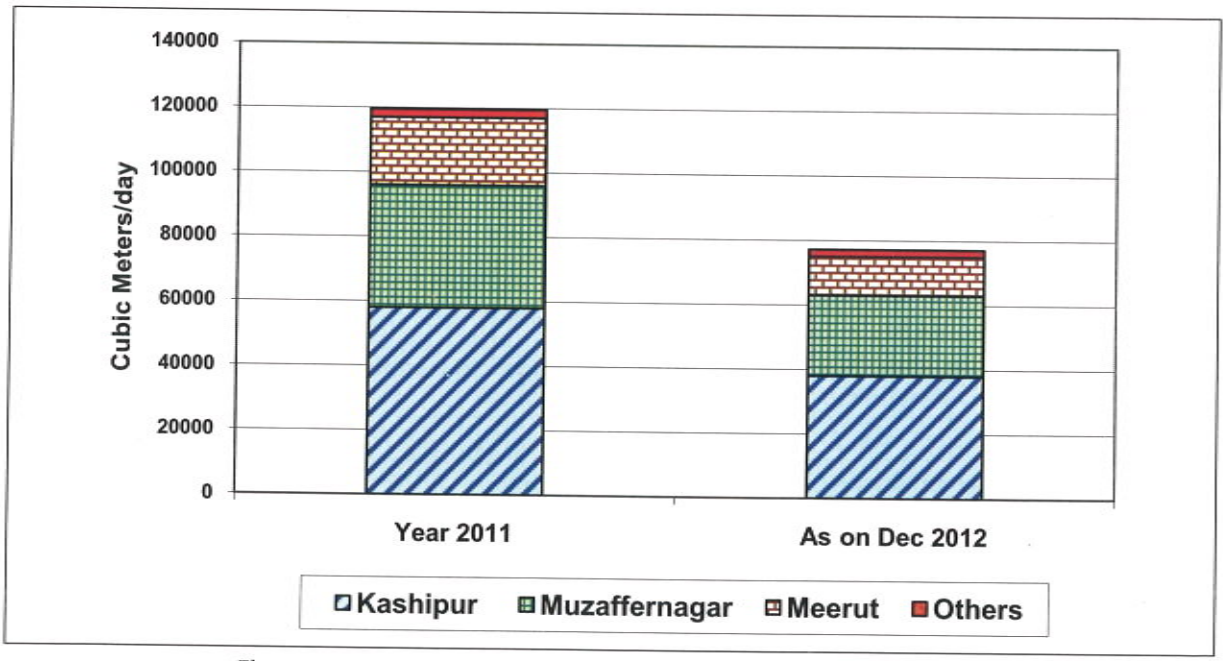


Figure 6.3: Reduction in Treated Wastewater Discharge from Selected Cluster

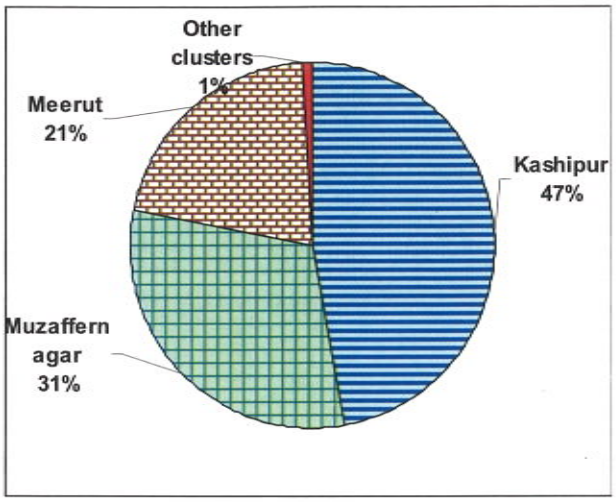


Figure 6.4 Percent Reduction of Treated Wastewater Discharge from baseline levels in Selected Clusters of Pulp & Paper Mill

Reduction in Pollution Load

As indicated in Table 6.10 & Figure 6.5 & 6.6 there has been an overall 77% reduction in COD (mass load) discharges into the recipient rivers from selected clusters due to implementation of Charter.

Table 6.10: Reduction in Pollutant Discharge Load into Rivers

Sector	COD Discharged into Recipient Rivers (T/day)		Reduction in COD Discharge due to Implementation of Charter (T/day)	Percent Reduction from baseline levels (%)
	Before Charter Implementation -Year - 2011	Charter being implemented (as on December 2012)		
Kashipur	80	7.5	72.5	91
Muzaffarnagar	63	8.1	54.9	87
Meerut	51	28	23	45
Other clusters	2	1.6	0.4	20
Total	196	45	151	77

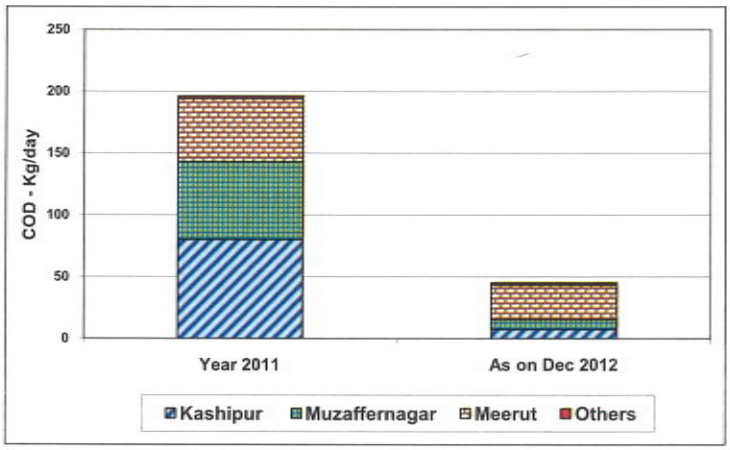


Figure 6.5 Discharge of COD (Mass Load) into Rivers in selected clusters

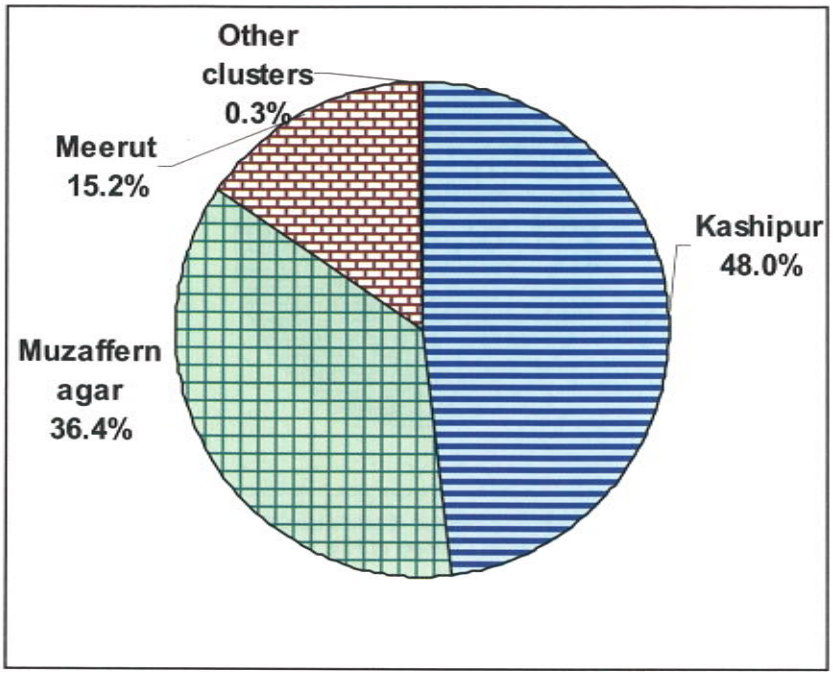


Figure 6.6 Percent Reduction in COD (Mass Load) Discharge into Rivers from Baseline Levels in Selected Clusters of Pulp & Paper Mills

(d) Impact of Charter Implementation on Green House Gases Reduction

The augmentation, upgradation / modification of existing ETPs, water conservation and process upgradation under Charter Implementation will result in significant reduction in pollution load and waste water discharged into the River Ganga and consequently reduction in green house emissions . The reduction potential of green house gases emissions is summarized in Table 6.12

Table 6.12: Reduction in Green House Gases Emission due to Charter Implementation

	Basis	
I	Total paper production in the region (Kashipur, Roorkee, Mooradabad, Meerut, Muzaffarnagar)	4350 tpd
	Discharge of wastewater to River Ganga from paper mills prior to implementation of charter based on CPCB survey report:2010	217500 m3/d
	Production Capacity of agro-based industry 40% of the total production of the region	1740 tpd
	Production Capacity of RCF industry 60% of the total production of the region	2610 tpd
	Average Wastewater discharge from agro based industry after implementation of charter based on water benchmarking (average of writing printing mill and kraft paper mill)	40 m3/ t of paper
	Average Wastewater discharge from RCF industry after implementation of charter based on water benchmarking (average of writing printing mill and kraft paper mill)	12.5 m3/ t of paper

II	**Reduction in wastewater discharge to Ganga after implementation of charter in the region**	
	Wastewater discharge from agro based paper industry (40 x 1740)	69600 m3/d
	Wastewater discharge from RCF based industry (12.5 x 2610)	32625 m3/d
	Estimated wastewater discharge in region to river Ganga by paper mills after implementation of charter	102225 m3/d
	Reduction in wastewater discharge in region to river Ganga from paper mills	115275 m3/d
III	**Reduction in BOD discharge to Ganga after implementation of charter in the region**	
	Present average load of BOD in the wastewater per unit production of paper (on the basis of analysis of samples collected from the mills of the region	27.4 kg/t of paper
	Present discharge of BOD after treatment to Ganga River from the region (Removal efficiency is assumed to be 60%)	47.7 tpd
	Estimated Load to BOD to ETP after implementation of Charter (assuming 40% load reduction in Agro based mills due to ODL, ECF, improved fiber recovery and improved washing and 20% load reduction in RCF mills with implementation enzymatic processes and improved fiber recovery)	85.5 tpd
	Estimated discharge of BOD after treatment to Ganga River from the region(Removal efficiency is assumed to be 95%)	4.3 tpd
	Estimated reduction in BOD discharge to River Ganga	44.4 tpd
IV	**Reduction in COD discharge to Ganga after implementation of charter in the region**	
	Present average load of COD in the wastewater per unit production of paper (on the basis of analysis of samples collected from the mills of the region)	62.3 kg/t of paper
	Present load of COD to ETP	271 tpd
	Present discharge of COD after treatment to Ganga River from the region (on the basis of analysis of samples collected from the mills of the region)	162.6 tpd
	Estimated Load to COD to ETP after implementation of Charter (assuming 30% load reduction in Agro based mills due to ODL, ECF, improved fiber recovery and improved washing and 10% load reduction in RCF mills with implementation enzymatic processes and improved fiber recovery)	222 tpd
	Estimated discharge of COD after treatment to Ganga River from the region (Removal efficiency is assumed to be 90%)	22.2 tpd
	Estimated reduction in COD discharge to River Ganga	140.4 tpd
V	**Reduction in Greenhouse gasses emission reduction**	
	Basis: ***1. Potential CH4 generation from COD discharge to river and conversion of CH4 to eq CO2 by GWP*** ***2.*** *CH4 emission = COD x B0 (CH4 generation per unit COD) x Methane conversion factor* ***3.*** *As per IPCC norms* *B0 = 0.25 kg CH4/kg COD* *MCF = 0.9 (for Asian countries)* *GWP of CH4 = 21* ***4.*** *Production days = 330*	
	Reduction in COD discharge to Ganga	*140.4 tpd*
	Potential CH_4 generation	*31.6 tpd*
	Annual emission reduction per annum	*218920t CO_2e.*

(e) Optimisation of Process Operations

With Process and ETP up gradation as per the Charter implementation programme and stress on proper and regular quantification of fresh water consumed, waste water discharged, energy and chemical consumption in ETP, monitoring of ETP etc, improved process optimization is expected leading to improved product quality and reduced environmental impact of the mills in the selected clusters.

(f) Skill / Human Resource Development

Since, availability of full time trained staff is mandatory under the Charter, a lot of job opportunities have become available for trained ETP Managers, Chemists, and operators. Further the mills have also got their existing staff trained on various aspects of ETP monitoring and operation at CPPRI. The trained staff are likely to help in proper maintenance, monitoring and operation of ETP, leading to improved environmental compliance.

Upgraded / Modified Effluent Treatment Plants (ETPs) in Operation at Kashipur Cluster

Upgraded / Modified Effluent Treatment Plants in Operation at Muzaffarnagar Cluster

ETP Lab Facility Created or under Construction at Pulp & Paper Mills of Selected Clusters

6.5 STATUS OF POLLUTION CONTROL IN CEMENT PLANTS IN EASTERN REGION

The Indian cement industry has emerged as second largest energy consumer. Cement industry with a capacity of 180 million tonnes/ year is one of the most energy intensive and growing sectors in India.

Preparation of cement involves mining of lime stone, crushing of lime stone, grinding of raw materials (principally limestone) and flyash/ slag, calcinations of the material (lime stone) in a rotary kiln and cooling to form the nodular balls, called clinker. The clinker is mixed with flyash/ slag and additives (gypsum, blue dust, silica- to enhance/ change the physical and chemical properties) and grinded in a ball mill (cement mill). Desired physical and chemical properties of cement are achieved by changing the percentage of additives.

The air pollution is major concern in cement plants, which is caused due to emissions from the stacks, due to fugitive emissions and from material handling, crushing, feeding etc. Collection and recycling of dust particles at every step helps in improving the efficiency of plant, as well as minimizing the emission levels.

At present there are 62 cement plants in eastern region (Jharkhand-6, Orissa-14 and West Bengal-42). Information from these cement plants was collected through questionnaire. Field inspection was also carried out for seven units.

- In eastern region all cement plants are based on Dry Process and having Horizontal Rotary Kiln (clinker manufacturing) except for one plant which is having vertical kiln. However this plant is in the process of conversion from Vertical to Horizontal kiln. Water is used for domestic purpose only.
- Due to less availability of lime stone in eastern region, most of the cement plants procure the raw material (clinker) from Madhya Pradesh, Rajasthan and Chhatisgarh state.
- The stack emission from the cement plants (for ball mill) were meeting the norms, but for kiln it was not meeting the norm.
- The fugitive emission control systems (dry fog system, cartridge filter, bag filter, telescopic chute) installed in cement plants are not very effective, may be due to under capacity pollution control equipment.
- Belt conveyors in some cement plants were not properly enclosed and causing fugitive emission.
- One plant is in process of installation of Reverse Air Bag Filter System for its kiln feeding (preheater) to limit the particulate emission of dust.
- One plant has installed the pneumatic conveying system of flyash from two boilers of its thermal power station, however, the thermal power station is not operating these boilers. Ash from other boilers is transported through capsule

bulkers which increases the vehicular pollution as well as the transportation cost.

- The dust collection system from the hoppers of the bag filters and cyclones are still not mechanized at most of the plants. Dust is collected manually from the floor after being allowed to fall free from the hoppers/cyclones. In some of the plants the dust collection was mechanized, however, the pneumatic dust conveying system needs to be provided.
- The dust stored in bags/open area within the premises of the industry. This may flow with storm water during rains. It was informed by plant personnel that dust is reused in the process or used for low lying area filling.
- The packing machines are fully automatic. However, spillage of cement was found due to damaged bags, error in machine operation etc.

6.6 MONITORING OF THE LARGE CEMENT PLANTS AT LUMSHNONG – MEGHALAYA

Eleven (11) large cement plants in Jaintia Hills of Meghalaya, especially in Lumshnong and its surrounding areas were monitored. The capacities of these cement plants vary from 900 TPD to about 5500 TPD. All these cement units have captive lime stone mines with mining lease areas varying from 1.5 Ha to 70 Ha. A few of the units are also having coal based captive power plants.

Table 6.13 Cement Plant at Lumshnong - Meghalaya

Sl. No.	Name of the unit	Year of commissioning	Production Capacity (TPD) Cement/ Clinker	Area under captive limestone mine (hectares)
1	Cement manufacturing company Limited	2004	1800	Wah Pynkon Limestone mine: 4.85 ha 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 M/s 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	Clinker:2000 Cement: 2600	

7	Amrit Cement Limited	2012	Clinker: 4303.03 Cement : 4545	30
8	M/s Star Cement Meghalaya Limited	2012	Clinker : 5300	75
9	M/s Goldstone Cement Limited	Not yet commissioned	Clinker : 1250	41.50
10	M/s 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. Therefore, emission monitoring was carried out to monitor the compliance by the industries and also to assess the pollution load from the cement plants. It is found that the almost all the cement plants have problems of uncontrolled fugitive emissions especially in fly ash handling areas. All the industries have installed various air pollution control devices (ESPs, Bag Filter. etc) to control source emissions at various units.

6.7 ASSESSMENT OF MERCURY IN CLINKER COOLER AND OTHER SOURCE EMISSIONS IN CEMENT INDUSTRIES

It is reported that Portland cement manufacturing industry (using coal) is the third largest source of mercury emission in the world. Therefore the study was undertaken by Central Pollution Control Board Zonal Office Bhopal to assess the emission of mercury from cement industries. In Central Zone 35 cement plants using various type of raw material as fuel i.e. coal, (imported & pet cock), RDF, Hazardous waste and plastics are operational.

The monitoring was performed in 23 cement industries (08 in Madhya Pradesh, 06 in Chhattisgarh and 09 in Rajasthan.) of Central Zone for assessment of mercury in source emissions. Water samples were also collected from nearby surface water bodies to assess the presence of Mercury in water if any. Samples of raw materials and product were also collected to establish the source of mercury in the process leading to environment. The

method used for assessment of mercury was as per USEPA. During the study, mercury concentration in source emissions was found between BDL to 0.18 mg/ Nm3.

6.8 ASSESSING THE VEHICULAR DENSITY IN SHILLONG AND EVALUATION OF RELATION BETWEEN TRAFFIC NOISE INDEX AND VEHICULAR DENSITY

Shillong, the capital city of Meghalaya State, spreads over a total area of 64.36 square kilometers and situated at an altitude of 1,496 meters. Roads are the most important link to the city and which is connected by motorable roads with neighbouring states and the country. The National Highways 40 and 44 passing through Shillong and also the city roads are small and narrow, leading to severe traffic congestion. The city does not have a bypass highway or a railway network. As such the trucks from other parts of the state and from other states passes through the city. This leds to an increase in air pollution, traffic density and traffic jams. Public transport consists of taxis and buses. No sub-ways or railways exist. This adds to the increasing traffic jams and vehicular emission.

The national highways and the city roads have settlements along the stretch. Educational hubs, hospital, etc are also located along the highways and therefore, exposed to high traffic noise. Moreover, there exists limited data exists regarding the vehicular density passing on these roads while no data on noise levels available from these vehicles. The study was undertaken to understand the vehicular density as well as the traffic noise index at Shillong. The overall objective of the project was to determine the relationship between vehicular density and traffic noise index (TNI).

Different hotshots as below were identified based on vehicular density, type of area and location.

- Governor's House, categorized as a Silence Zone, the area consists of several government offices thus human population is high only during work hours. Thus, influence of vehicular and noise pollution is only during the day. There are no human settlement in the area.
- Nongrim Hills, categorized as a Residential Area, the area contains a high numbers of human settlements and is highly influenced by vehicular and noise pollution both during the day and night.
- Motphran, categorized as Commercial Area, comprise significant numbers of commercial stores and markets and hence a high human population during the commercial hours. Influence of vehicular and noise pollution is only during the day.

The vehicles were categorized into the following categories to enable the assessment of vehicular density:

1. Two wheelers and Three wheelers
2. Petrol Driven Vehicles
3. Diesel Driven Vehicles
4. Light Duty Vehicles
5. Trucks and Busses

Manual counting of vehicles as per identified categories was undertaken at selected locations. The vehicles were then categorized into three categories based on vehicular density range.

Category	Vehicular Density range
Category 1	< 1000
Category 2	1000-2000
Category 3	>2000

Sound pressure levels were measured at these locations using a Sound Pressure Level Meter. Traffic Noise Index was then calculated using the formula:

$$\mathbf{TNI = 4 \times (L_{10} - L_{90}) + (L_{90} - 30)\ dB\ (A)}$$

Where L10 and L90 are decibel levels that exceeded 10% and 90% of time

The Vehicular Density (VD) and Traffic Noise Index (TNI) at the selected sites are as under:

Table 6.14: Traffic Noise Index (TNI) and Vehicular Density (VD) for Governor's House

Sl. No.	Start Time	End Time	14-09-2012		27-11-2012	
			VD	TNI	VD	TNI
1	7:00 AM	8:00 AM	702	79.6	908	45.7
2	8:00 AM	9:00 AM	1724	73.9	2310	59.2
3	9:00 AM	10:00 AM	1855	73	2436	78.8
4	10:00 AM	11:00 AM	2296	74.4	2950	51.4
5	11:00 AM	12:00 PM	1802	81.1	2601	63.5
6	12:00 PM	1:00 PM	1997	75.1	2376	71.1
7	1:00 PM	2:00 PM	2063	94.2	2338	85.3
8	2:00 PM	3:00 PM	1937	81.8	1746	41.1
9	3:00 PM	4:00 PM	1866	83	2214	57.4
10	4:00 PM	5:00 PM	1927	92.5	2096	62
11	5:00 PM	6:00 PM	1484	81.9	1869	68.1
12	6:00 PM	7:00 PM	1708	72.1	868	54.4

Table 6.15 : Traffic Noise Index (TNI) and Vehicular Density (VD) at Nongrim Hills

Sl. No.	Start Time	End Time	28-11-2012		07-11-2012	
			VD	TNI	VD	TNI
1	7:00 AM	8:00 AM	718	96.7	309	96
2	8:00 AM	9:00 AM	1092	82.8	800	86.5
3	9:00 AM	10:00 AM	1029	68.5	769	84.1
4	10:00 AM	11:00 AM	1317	72	1016	83.6
5	11:00 AM	12:00 PM	1205	58.7	948	88.2
6	12:00 PM	1:00 PM	1076	73.8	709	90.8
7	1:00 PM	2:00 PM	874	47.2	845	92.8
8	2:00 PM	3:00 PM	838	61.4	798	88.8
9	3:00 PM	4:00 PM	1000	132.8	716	86
10	4:00 PM	5:00 PM	921	62.8	792	77.2
11	5:00 PM	6:00 PM	1045	83.9	858	89.9
12	6:00 PM	7:00 PM	788	81	495	86.1

Table 6.16: The Traffic Noise Index (TNI) and Vehicular Density (VD) at Motphran

Sl. No.	Start Time	End Time	28-11-2010		30-11-2010	
			VD	TNI	VD	TNI
1	7:00 AM	8:00 AM	407	84.8	659	90.7
2	8:00 AM	9:00 AM	558	80.5	814	87.7
3	9:00 AM	10:00 AM	687	82.7	877	84.1
4	10:00 AM	11:00 AM	706	85	891	69.9
5	11:00 AM	12:00 PM	809	85.3	847	80
6	12:00 PM	1:00 PM	722	79.4	775	75.5
7	1:00 PM	2:00 PM	732	86	805	82.6
8	2:00 PM	3:00 PM	870	76.8	870	72.3
9	3:00 PM	4:00 PM	651	78.5	958	77.1
10	4:00 PM	5:00 PM	874	79.2	791	75.5
11	5:00 PM	6:00 PM	624	75.9	658	73.8
12	6:00 PM	7:00 PM	557	74.5	1829	84.8

The traffic noise index was categorised into three categories :

Category	Traffic Noise Index (dB(A)) range
Category 1	Less than 70
Category 2	70 – 80
Category 3	More than 80

The results obtained were then grouped according to the categories of vehicular density and traffic noise index.

Table 6.17 :

Vehicular Density (VD) Range	Traffic Noise Index /Sound Levels dB (A) category			Total
	<70	70-80	>80	
< 1000	5	13	25	43
1000-2000	4	6	8	18
2000 >	5	3	2	10
Total	14	22	35	71

Pass-by Period, the period refers to the time the vehicles take to pass through the area, was the main factor in determining TNI. Traffic management system play an important role in the formation of traffic jams, which in-turn influences the pass-by period. Silence Zone Area comparatively have better traffic management system, which prevents traffic jams. Also, if a traffic jam is formed it is controlled by the system so there is a regulated flow of vehicles. Also in such areas the use of horns is not allowed. The Residential Areas and Commercial Areas do not have or have a very inefficient traffic management system. Thus, the probability of formation of traffic jams is high which lowers the pass-by period. The frequent usc of horns further contribute to TNI.

The type of vehicle was also another factor in influencing TNI. Diesel vehicles ignition takes place at a higher pressure compared to Petrol vehicles causing higher sound levels thus diesel vehicles were found more contributing to TNI. Two wheelers could also contribute significantly to TNI. In two wheelers, the source of sound is not enclosed which could produce more sound levels.

The time could be another factor influencing TNI during 7:00 to 8:00 AM or 6:00 to 7:00 PM time period the number of vehicles have been comparatively low, so there was an even flow of cars. This results in lesser usage of horns and higher pass-by periods. However, during 8:00 to 9:00 AM and 2:00 to 3:00 PM time period which are school starts hours and end and during 9:30 to 10:30 AM and 5:00 to 5:30 PM which are the hours for offices start and end there was an increase in the number of vehicles, which results into higher uses of horns and more TNI lower pass-by periods

6.9 STUDIES ON IMPACT OF AIR POLLUTION ON CORROSION OF METALLIC AND NON-METALLIC MATERIALS

A study was initiated by Central Pollution Control Board, Delhi and CSIR-NML, Jamshedpur to study the deteriorating effect of air pollutants and various climatic parameters on materials in November 2010 Nine locations viz. Jamshedpur, New Delhi, Lucknow, Kolkata, Mumbai, Chennai, Nagpur, Jorhat and Palampur (a virgin area) were selected depending upon the geographical locations and fluctuations in environmental and climatic conditions, nature and sources of pollutants for the exposure of the materials across the country. The materials were exposed for 1, 2 and 4 years in the set of triplicates to study the nature of corrosion of products and mechanism of degradation of the materials.

The data has been generated for impact of air pollutants on corrosion rate of different metals and materials. Phase analysis of components present in rust formed at different locations of exposure has been carried out by Raman Spectroscopy and XRD.

The preliminary observation of metallic corrosion in different climatic conditions indicated following findings:

- Increase in Air pollutants affected corrosion rate of zinc metals and its alloys;
- Nature of pollutants in air affect deterioration of metals / alloys;
- SO2 in air has maximum impact on deterioration of ferrous materials;
- PM10 indirectly accelerates the corrosion rate;
- Metallic contents in dust of an environment control the corrosion rate

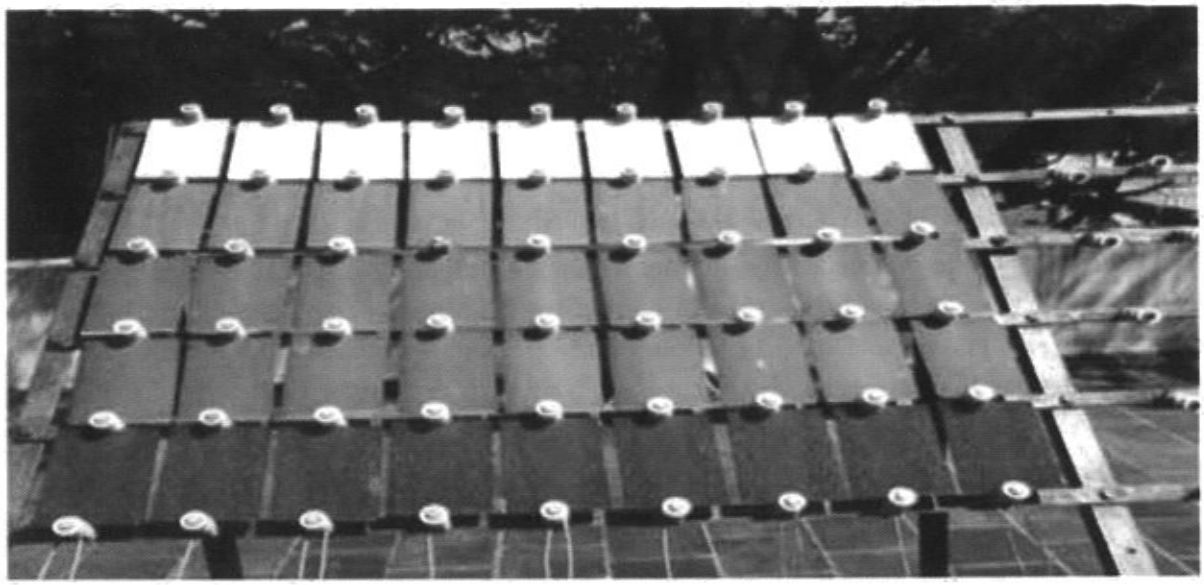


Fig. 6.7 Samples after exposure of 1 year at Chennai

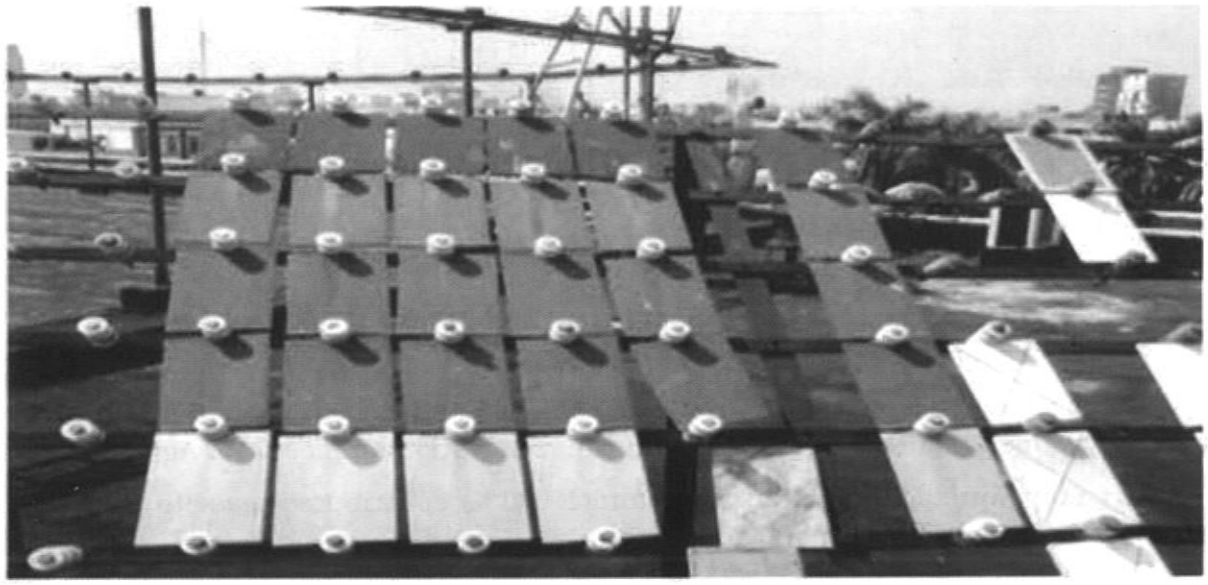


Fig. 6.8 Samples after exposure of 1 year at Kolkata

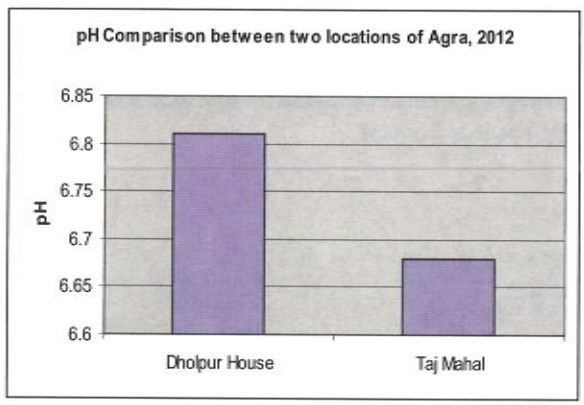
The preliminary observation on the impact of air pollutants is presented in Table 6.18:

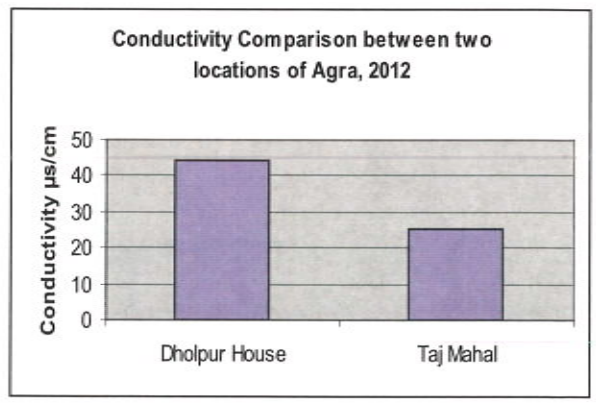
Table 6.18 Location-wise Corrosion rate of various materials due to impact of air pollutants

Material	Corrosion rate (µm/year) Locations-wise			
	Jamshedpur	New Delhi	Lucknow	Mumbai
Weathering steel	2+.96	18.57	11.68	26.19
Brass	1.07	4.19	1.40	3.76
Bronze	2.91	3.32	1.22	3.80
Copper	3.40	4.35	2.56	4.58
Aluminum	0	1.28	0	0.38
Zinc	1.53	1.70	-	2.62

6.10 RAIN WATER IONIC PROFILE AT AGRA

The rain water ionic profile study has been carried out in Agra, Uttar Pradesh with the aim to know the ionic composition of rainwater . Rainwater samples were collected at roof top on event basis during whole study period. Two category of water soluble ions i.e. cations (Ca++, Mg++, Na+, Li+, K+, NH4+) and anions (SO4--, NO3-, PO4---, F-, Cl-) were determined in rain water samples using Ion Chromatograph.





- None of the rain water sample was detected having pH less than 6.0 during the study period i.e. year 2012.
- Conductivity of the rain water samples ranged between 7.60 to 169µS/cm with annual average of 36 µS/cm.
- The level of Ca++ was maximum (227.66 µeq/l) and K+ was the minimum (6.38 µeq/l) among all the detected ions in the rain water samples from Agra
- Ca+ contributed maximum (27%) and K+ (1%) contributed least to the ionic profile of rain water. Among anions, contribution of SO_4-- and C_l- was maximum (12% each) and that of F- was least (2%). The order of ionic presence in rain water was $Ca^{++}>Na^{+}$ $NH_4^{+}>SO_4^{--}>Cl^{-}>$ $Mg^{++}=NO_3^{-}>PO_4^{---}>F^{-}>K^{+}$.

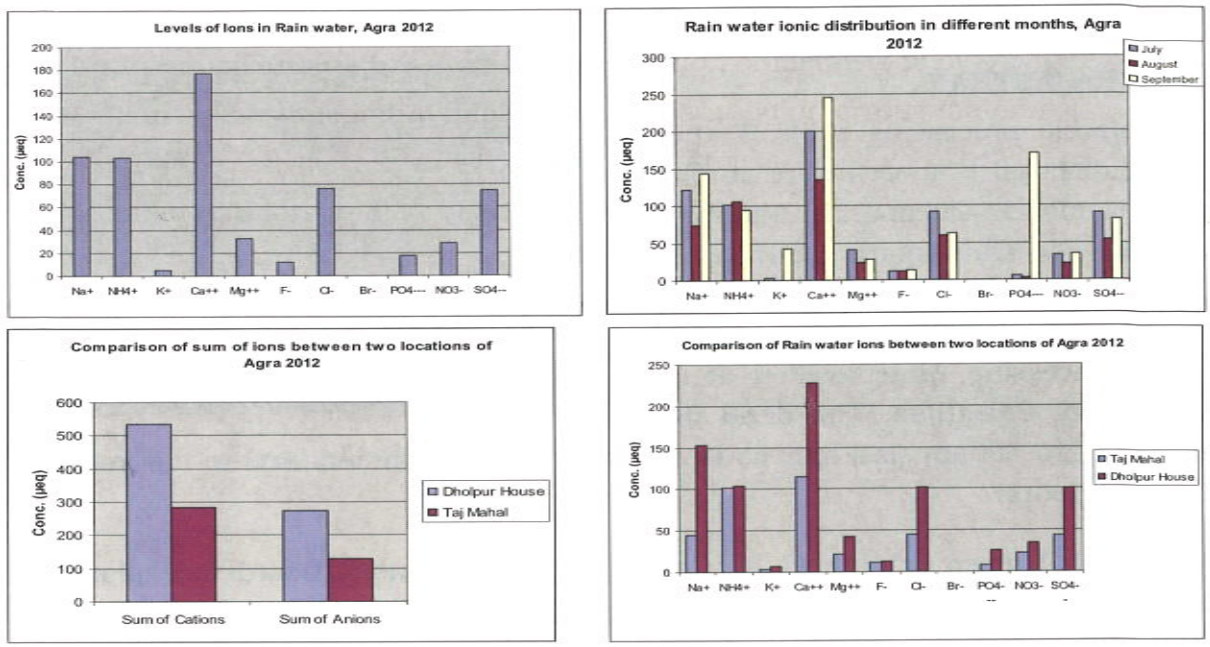


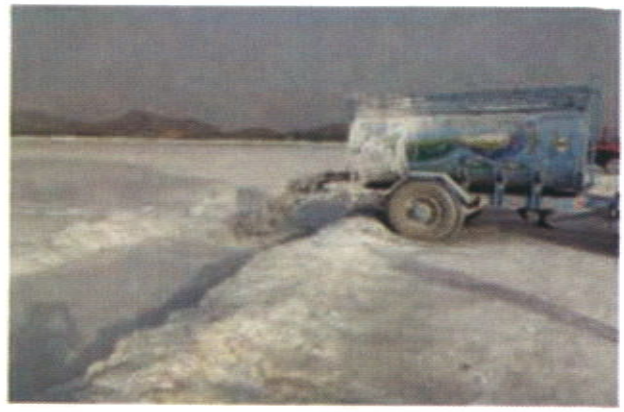
Figure 6.11 Ionic Profile of Rainwater at Agra

- Level of all the rainwater ions were detected generally lower at Taj Mahal location, in comparison to Dholpur house. Annual average value of sum of cations and anions were found higher at Dholpur house location than Taj Mahal location at Agra.
- Na^+, K^+, Ca^{++}, Mg^{++}, F^-, Cl^-, $PO4^{---}$, $SO4^{--}$ and NO_3- showed a typical pattern in their concentration. From July to August, level of these ions were found depleted but during September month they all tend to increase their concentration in rain water samples.
- Concentration of NH_4^+, Na^+, K^+, Ca^{++}, Mg^{++}, NO_3^-, F^-, Cl^- and SO_4^{--} ions (annual average values) was found depleted from the year 2011 to 2012.

Table 6.19 : Deviation in Ionic Profile of Rain water at Agra

Ion	Annual Average concentration (µeq/l) during year 2011	Annual Average concentration (µeq/l) during year 2012	Increase/ decrease w.r.t year 2011	% Change w.r.t year 2011
NH_4^+	112.67	102.84	↓	9
N_a^+	153.08	104.07	↓	32
K^+	46.01	5.14	↓	89
Ca^{++}	250.25	176.96	↓	29
Mg^{++}	65.12	32.85	↓	50
NO_3^-	61.76	28.54	↓	54
F^-	12.02	11.84	↓	1
Cl^-	121.83	76.20	↓	37
PO_4^{---}	13.70	17.53	↑	28
SO_4^{--}	124.76	74.56	↓	40

6.11 DISPOSAL OPTIONS OF MARBLE SLURRY IN RAJASTHAN



The marble processing units & their slurry disposal practices were studied at Rajsamand, Kishangarh, Makrana, Udaipur & Chittorgarh districts of Rajasthan state. Around 5-6 Million Tons waste/slurry is generated from 1100 processing units located at 16 districts of Rajasthan. The dried fine particles (45-300μm size) may cause ill effects on environment and to the health of local residents.

A study has been conducted by Central Pollution Control Board to explore the possibility of reuse & recycle of Marble Dust Slurry in different areas. To manage this huge inorganic & non-hazardous waste in gainful/productive use, following options were reviewed for utilization of marble slurry:

- Utilization of marble slurry in cement manufacturing.
- Synthetic gypsum through chemical reaction with marble slurry.
- Utilization of Marble slurry dust in road construction.
- Utilization of Marble slurry as Low Cost Binder.
- Utilization of marble slurry in brick manufacturing.

Guideline for management of marble slurry being developed in consultation with Rajasthan State Pollution Control Board (RSPCB).

6.12 IMPACT OF INDUSTRIES ON THE RIPARIAN LAND OF RIVER HALDI AND SOCIO-ECONOMIC MALADIES

Haldia Township is bordered by Haldi River, which is an off-shoot of Ganga River. It is a tributary of Hugli River flowing through Purba Midnapur district. It is the last major river that flow into River Hugli before its confluence into the sea. The river Haldi joins Hugli at the industrial town of Haldia. A number of small natural streams drain into Haldi River form the main land water system. A host of related impacts to the water system such as degradation of land through soil erosion, water logging, pollution and reduction in organic matter content have several proximate and underlying causes. The pollution of the river affects lakhs of people, who live in close proximity of the river. This river receives an impact of Green Belt canal from the industrial complex of Haldia.

Central Pollution Control board undertook an investigation of surface water quality of haldia river. Quantification of the samples analysed from Green Belt Canal, which

drains into the river Haldi and Hugli indicates that pH varied from 6.8 to 8.7 while Conductivity from 5167 to 14350 µS/cm. The ionic composition of the River Haldi towards downstream was found to be as Ca>Mg> NH4+ (Cation) and Cl>SO4> NO3- (Anion). The high concentration of chloride ion may be from the industrial drains i.e. green belt canal and also there is mixing of coastal water at the time of High Tide. Among the anion the dominance of Sulphate in the river Haldi may be due to the discharge of sewage, industrial drains, atmospheric deposition and surface run-off from agriculture fields.

Results of surface soils analysis of various industries indicate that pH varied from 5.8 to 9.3, Conductivity varied from 120 to 5340 µS/cm, organic matter varied from 0.34 to 3.18% and nature of the soil was found sandy to silty clay. Surface soil of the industrial unit, through erosion, finds its way from riparian land to the river.

It has been observed that Haldi River receive industrial as well as the agriculture drainage into the river. It is also observed during the study, that extreme levels of ionic concentration (minimum and maximum) in water may not favour biological establishment in the form of benthic fauna.

6.13 IMPACT OF MANGROVE ECOSYSTEM ON EMISSION OF GREEN HOUSE GASES.

Sunderbans, the world largest stretch of mangrove ecosystem, lies to the South–West of Bangladesh, part of which has been declared as world heritage site. Oceans play an important role in the climate system being the source and sink for green house gases. Mangrove litter produces huge amount of organic material for the whole ecosystem. Carbon is stored in the soil then it is released into the environment either in the form of green house gases or dissolved or particulate carbon into the water courses and in ambient air. Apart from this, the loss of nitrogen from the forest soil is a concern. Nitrous oxide is a green house gas whose concentration is increasing at the rate of about 0.2-0.3% per annum. It is produced from a various biological sources in soil and water.

Central Pollution Control Board, Zonal Office Kolkata undertook a study to investigate the possible route of green house gases from the soil to the air. Root Zone soil was collected from different sites inside the Jharkhali mangrove forest. Microorganisms in the soil are critical in decomposing organic residues and recycling soil nutrients. Bacteria in the soil are efficient in recycling carbon as well as nitrogen. To monitor the response of green house gases in the air, with respect to soil characteristics can be corroborated by the analytical results of soil of all the unit of Jharkhali forest. pH of the soil varied from 7 to 8 and silt clay is the nature of the soil analyzed throughout the forest range. The soils are exposed to saline water intrusion and chances of erosion of top soil are normal and part of the organic matter is mineralized.

Mineralization of organic matter and available nitrogen by the bacteria plays an important role. Collected soil from Jharkhali forest clearly indicates the decrease of available nitrogen in the soil, when incubated for 24 hrs. Available nitrogen in the soil varied from 89.6 to 159.6 mg/kg and after incubation for 24 hrs, nitrogen uptake by the soil bacteria indicates that level of the nitrogen reduces to 67.2 to 86.8 mg/kg. This mineralization may contribute to the air in different forms of nitrogen which helps in the formation of green house gases.

6.14 TOXICITY EVALUATION OF WATER AND WASTEWATER AT CRITICALLY POLLUTED AREAS

A study was undertaken by Central Pollution Control Board to assess toxicity of water and wastewater at three critically polluted areas i.e. Najafgarh drain basin (Delhi), Panipat (Haryana) and Ludhiana (Punjab).

33 locations were studied at three selected polluted areas, which belong to three categories i.e. sources of environmental pollution (11 locations), receiving water bodies both surface (10 locations) and ground water (12 locations). Samples were drawn twice from the studied locations and tested for Bioassay as per the requirement of CEPI. Two other parameters i.e. pH (for both type of receiving water bodies) and DO (for surface water bodies) were also included in the project study because these parameters are also important factors for toxicity.

The findings of study reflect that the toxicity level of source of environmental pollution at Najafgarh drain basin varied from 10% (low toxic) to severely toxic with 100% mortality with in half hours. At Panipat and Ludhiana this level was found varying from non toxic (0% mortality) to severely toxic (with 100% mortality with in 2 hours to instantly).

All the ground water bodies located at studied Critically polluted areas reflect 'A' Class of water (no death in 5 days) as per classification criteria adopted for CEPI except one body of Ludhiana where the toxicity of water was observed varying from 40% in 2 days) to 60% (in day 1).

The toxicity level of surface water bodies located in Najafgarh drain basin and Panipat were found ranging from no mortality in 5 days ('A' Class water) to 100% mortality of Zebra fish within half hour to 4 hours respectively (not meeting criteria of any Class of water). At Ludhiana the variation in the values of Bioassay data was 0% mortality ('A' Class water) withn 5 days to 10 % mortality in 2 days ('C' Class water).

All the studied receiving water bodies located in selected critically polluted areas confirmed water quality as Class 'A' (CEPI criteria) in terms of pH as its value ranged from 7.0 – 8.5. IN CEPI Dissolved Oxygen (DO) in terms of percent saturation is used to classify the water of surface water bodies. The saturation level of DO in the surface water bodies at Najafgarh drain basin was observed varying from 2.9% (no Class) to

94.5% ('B' Class of water) whereas, at Panipat it was in the range of 0.0% (no Class) - 102.0%. At Ludhiana this level was in the ranged of 5.3% (no Class) to 83.3% ('B' Class water).

6.15 PERFORMANCE EVALUATION OF ETPS AND HAZARDOUS WASTE MANAGEMENT IN PHARMACEUTICAL INDUSTRIES

Pharmaceutical industries are one of the highly polluting industry and generate wastewater with high COD along with hazardous waste. There are 15 large and medium scale pharmaceutical industries in Central Zone out of that 11 are in Madhya Pradesh and 04 are in Rajasthan States.

It was observed that pharmaceutical industries have provided conventional ETPs based on activated sludge process consisting primary treatment (neutralization, flocculation & primary settling), secondary treatment (biological treatment comprising of surface aeration, secondary settling) and tertiary treatment (dual media filtration, pressure sand & activated carbon filter/ RO).

Multiple Effect Evaporator

R O System

Central Pollution Control Board Zonal office, Bhopal undertook a project on performance evaluation of ETPs & Hazardous waste management in pharmaceutical industries. The study has been conducted for performance evaluation of ETPs provided in major industries. Samples were collected from the inlet & outlets of ETP and analyzed for performance evaluation. The range of inlet COD was 3782 mg/l to 31040 mg/l and BOD was 964 mg/l to 5333 mg/l. The range of COD and BOD in treated effluent was 5327 mg/l to 43 mg/l and 1205 mg/l to 11 mg/l respectively.

Out of the 15 industries 2 industries have incinerator facilities within the premises for incineration/final disposal of hazardous waste while other remaining units are disposing their hazardous waste through TSDF.

6.16 INVENTORISATION OF INDUSTRIAL CLUSTERS IN THE COUNTRY AND ASSESSMENT OF THE NEED FOR CETPS

Central Pollution Control Board (CPCB) on advice of Planning Commission and on behalf of Ministry of Environment & Forests, Government of India (MoEF) has undertaken network study 'Inventorisation of industrial clusters in the country and assessment of the unmet need for common effluent treatment plants' in association with IIT-Mumbai, IIT-Kanpur, EPTRI-Hyderabad, and TERI-New Delhi. The study was initiated during year 2011-12 and the executing institutes submitted the final reports during year 2012-13. Analysis of the information received was completed and the list of industrial areas reported has been updated based on available information on MSMEs. It is revealed that there are about 3000 industrial areas. The combined report is under finalization for publishing.

6.17 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 'Global best practices' in industrial wastewater treatment technologies and treated-effluent disposal/reuse, with special reference to CETPs' in association with The Energy and Resources Institute (TERI), New Delhi. The study was awarded during the year 2011-12. The study has been completed and executing institute submitted the final report during year 2012-13.

6.18 OVERVIEW OF VEHICULAR POLLUTION CONTROL MEASURES

Air Pollution generated by human activities adversely affects human population and causes great economic damage to ecosystems and society. Urban air pollution is a major problem across the country. Rural to urban migration, growth in mobility demands, demands for power and industrial production are some of the reasons for increasing deterioration of air quality in urban areas. Vehicular sector is assumed to be one of the major sources of air pollution in urban areas and several measures have been undertaken to control pollution from vehicular sources.

Vehicle Registration details

- Registered motor vehicles in India- 142 million vehicles (year 2011-12).
- Registered motor vehicles in Delhi 7.5 million vehicles (year 2011-12)

Table 6.20 : Share of different categories of vehicles in total vehicular population:

S.No	Vehicle type	Share (%)
1	Two Wheelers	72%
2	Cars & Jeeps	14%
3	Buses (including omni buses)	1%
4	Good Vehicles	5%
5	Other vehicles	8%

Automobile Pollution Control initiatives taken, include enforcement of series of control measures ranging from notification of advanced Euro-IV equivalent emission norms, commensurate with fuel quality norms 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. Salient measures undertaken for vehicular pollution control are as follows:

Mass Emission Standards

The Ministry of Road Transport and Highways (MoRTH) acts as a nodal agency for the formulation and implementation of various provisions of the Motor Vehicle Act and CMVR.

- Mass Emission Standards (Bharat Stage IV) implemented for all categories of new four wheel vehicles in 13 mega cities namely Delhi (NCR), Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur, Agra, Lucknow and Sholapur from the year 2010.
- BS-IV Emission norms for new four wheel vehicles implemented in 7 more cities namely Puducherry, Vapi, Mathura, Jamnagar, Ankleshwar, Hissar, Bharatpur from March 2012. Further as per Ministry of Petroleum & Natural Gas, 50 cities will be made BS-IV compliant by the year 2015
- Mass Emission Standards (Bharat Stage III) have been implemented for all categories of new four wheelers all over the country, from 1st October 2010.
- Mass Emission Standards (Bharat Stage III) implemented for two and three wheelers all over the country, from 1st October, 2010.
- Mass Emission Standards (Bharat (Trem) Stage III) implemented for diesel driven agricultural tractors, from 1st April, 2010 for the category < 37KW and from 1st April, 2011 for the category >37 KW.
- Bharat Stage III (CEV) emission norms implemented for construction equipment vehicles since April 1, 2011. These emission norms are based on the engine powered construction equipment i.e non-road vehicles.
- Bharat Stage-III mass emission norms notified for gasoline driven power tillers manufactured on and from July 1, 2013.
- Alternate Mass emission standards (BS-III) for two wheel gasoline vehicles with engine capacity exceeding 50 CC or a maximum design speed exceeding 50 km/hr based on Worldwide Harmonised Motorcycle Emission Certification (RWMTC) implemented from May 9, 2011

Fuel Quality Specifications

- Auto-Fuels commensurate to BS III specifications has been made available in the whole country and commensurate to BS IV specifications has been made available for 20 cities cities as per the road map of Auto Fuel Policy

- The Research Octane Number (RON) for premium gasoline available in 20 cities boosted to 95 with lead content reduced to 0.005 g/l and benzene content of maximum 1%. The content of sulphur in gasoline is reduced to 0.005% (50 mg/kg) from 0.015% (150 mg/kg) in BS-IV compliant 20 cities. However, all over the country, content of sulphur in gasoline is 0.015% (150 mg/kg) .

Table 6.21: Gasolene Specifications for BS-IV Compliant Cities and for Entire Country

Specification	20 cities (BS-IV Compliant)	Entire Country
Octane Number	91*	91*
Lead	0.005 g/l	0.005 g/l
Sulphur	50 ppm	150 ppm
Benzene	1 %	1 %

- For diesel, the Cetane Number has been enhanced to 51 with Sulphur content reduced further to 0.005 % (50 mg/kg) in BS-IV compliant 20 cities by. The amount of sulphur in diesel has been reduced to 0.035% (350 mg/kg) all over the country.

Table 6.22 Diesel Specifications for BS-IV Compliant Cities and for Entire Country

	20 cities (BS-IV Compliant)	Entire Country
Cetane Number	51*	51*
Sulphur	50 ppm	350 ppm
Poly Aromatic Hydrocarbons	11% mass	11% mass
Distillation 95% vol. Recovery at 0 C, max	360oC	360oC

**for regular quality*

In-Use Vehicles

- New PUC norms have been notified for both gasoline and diesel BS-IV vehicles, wherein besides idle emission limits for gasoline vehicles, high idle emission limits also included and implemented from February, 2013.
- MoRTH in collaboration with ARAI (Automotive Research Association of India) has proposed to develop model I&C (Inspection & Certification) centres in all the states and the said model will further be replicated by all state governments in respective states.
- The proposal for setting up model I&C centres for ten states viz. Andhra Pradesh, Karnataka, Haryana, Himachal Pradesh, NCT of Delhi, Maharashtra, Madhya Pradesh, Uttar Pradesh, Gujarat, Rajasthan has already been approved by MoRTH.

Alternate Fuels - Initiatives

There has been lot of developments in this front when various organizations including the Planning Commission, Oil Companies, Auto Sectors, CPCB 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 reported below:

- Presently CNG vehicles have been plying in 70 cities of the country. More than 11 lakh CNG vehicles have been plying all over the country.
- In Delhi more than 5.5 lakh CNG vehicles have been plying. Further Delhi has world's largest public transport system that runs on CNG
- Auto LPG Dispensing stations (ALDS) have been established in 232 cities/towns of the country.
- In December 2009, Government adapted National Bio-Fuel Policy, which requires blending of 20% bio-ethanol in gasoline and 20% bio-diesel in diesel by the year 2017.
- Bio-fuels mainly Ethanol and Biodiesel (in B20 form) are the prospective options for India. Pilot studies on ethanol and biodiesel are continuing.
- Efforts for developing and popularizing electric vehicles also gained momentum during this year. Already "Reva Motors" have commercialized a small electric/ battery car. Many three-wheeler manufacturers are also contemplating electric driven OEM for Indian markets.
- Ministry of Petroleum & Natural Gas has set up a Hydrogen Corpus Fund with a corpus of Rs.100 crore with contribution from five major Oil Companies and Oil Industry Development Board (OIDB) for supporting Research and Development in various aspects of hydrogen, which could substitute part of natural gas as transport fuel in future.
- For promoting Hydrogen as auto fuel with the help of Hydrogen Corpus Fund a Hydrogen-CNG dispensing station has been set up at IOC, R&D Centre, Faridabad to cater the re-fueling needs of test/demo vehicles operating on Hydrogen - CNG blends.
- IOC and Mahindra & Mahindra have agreed to jointly develop Fuel Cell Vehicles. In this regard a joint proposal on "Development of Fuel Cell Vehicles" has been submitted to Scientific Advisory Committee of MoPNG for funding from Hydrogen Corpus Fund.

Other Measures

- In Delhi BRTS has been implemented at various corridors since year 2008.
- Road-infrastructure development, management and by-passing of inter- state vehicles, parking restrictions, etc. are other measures being adopted in various cities.
- The Delhi metro line has been extended to various stretches of Delhi for catering more people, thereby promoting use of mass public transport system. Other cities are also actively taking initiation to start metros and other mass transport systems.
- Phasing out of 15 year old commercial vehicles in Delhi
- Interstate trucks, which are not destined to Delhi are not allowed to ply within the city limits.
- Delhi Monorail system has been proposed and likely to be implemented in phased manner

Chapter VII

ENVIRONMENTAL RESEARCH

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

The Central Pollution Control Board (CPCB) in collaboration with Dr. S. K. Biswas had conducted a R&D Project entitled "Treatment of Water and Wastewater using Sludge-Reagent-Product (SRP) Technology" to tackle the problem of huge amount of sludge generated from the water works which use alum for precipitation of colloidal particles by coagulation and flocculation process. While dealing with the sludge problem, CPCB came with an innovative idea of regenerating and recycling the alum along with positive charged colloidal particle in water treatment process.

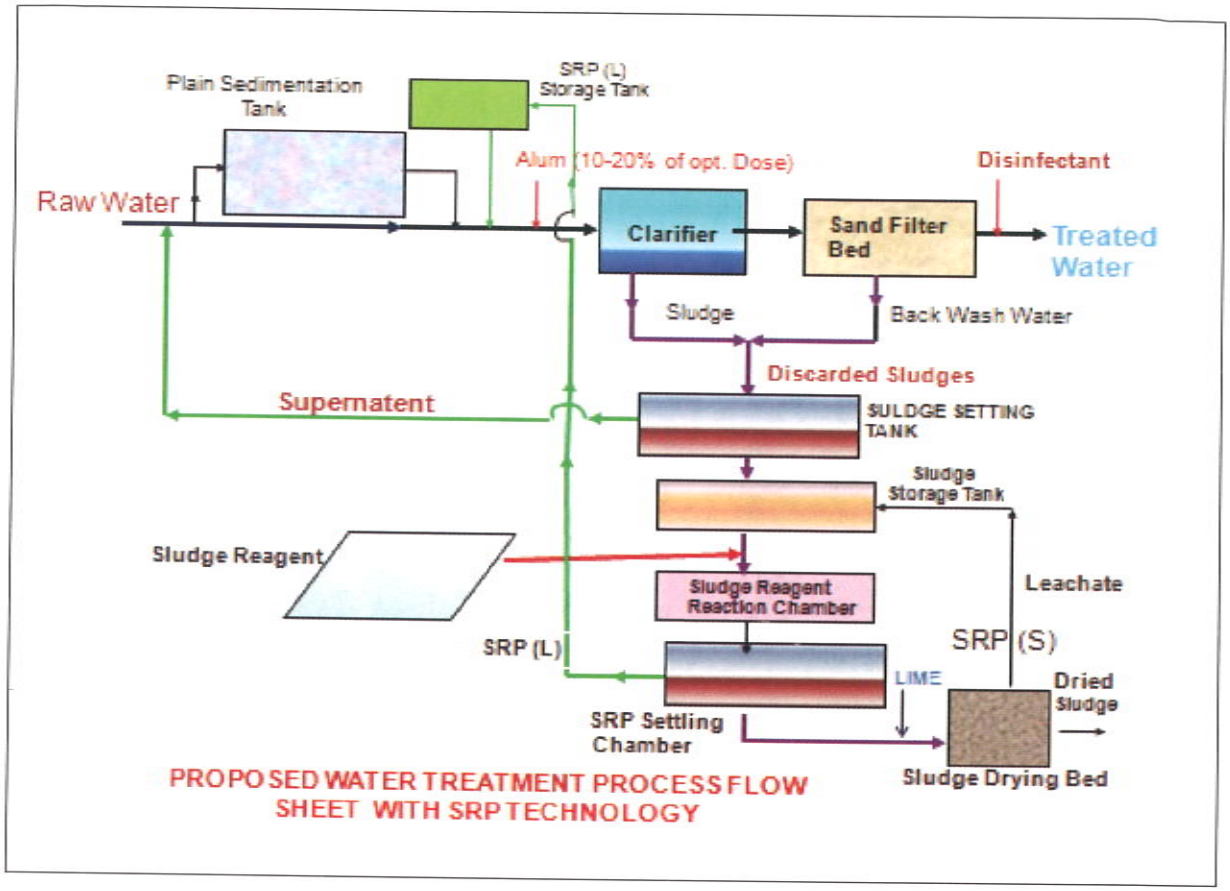
This treatment technology entitled "An Integrated Plant for Treatment of Raw Water Using Discarded Sludges to Produce Drinking Water" has been patented vide Indian Patent No. 215808 (Filed in April 2001 and Granted in March 2008).

Based on the above ground work the MoU was executed between CPCB and Delhi Jal Board (DJB) for Construction and Operation of 0.5 MLD Pilot Water Treatment Plant based on SRP technology at Bhagirathi Water Treatment Plant, Gokulpuri, Yamuna Vihar Delhi. The Pilot Project is funded by Central Pollution Control Board.

PILOT WATER TREATMENT PLANT BASED ON SRP TECHNOLOGY AT BHAGIRATHI WATER TREATMENT PLANT, DJB YAMUNA VIHAR, DELHI

The construction and successful trial-operation of Pilot Plant was completed by M/s Hydrotech, Delhi (Contractor) with technical consultation of CPCB & DJB.

The drinking water quality of SRP-Technology based Pilot-Plant was tested by Delhi Jal Board and CPCB . The water quality of Pilot Plant is at par with the water quality from conventional treatment process



Sludge Reagent Product (SRP)

The discarded sludge obtained from coagulant aided sedimentation process of coagulation of water treatment system was treated chemically and the product obtained was named as 'Sludge Reagent Product' (SRP) which was used successfully as coagulant in place of the fresh alum used in the water treatment.

SRP Production process in Pilot Plant

Sludge Reagent Product (SRP) Process :

- Collection of sludge from clarifloculator and sand filter backwash. Transferring sludge into the **Sludge–Thickener-Tank** and retained it for 45 Minutes
- Transferring (recovered) supernatant water in to the Raw water in-take point.
- Transferring thickened sludge into the **Sludge-Storage-Tank**.
- Transferring fixed volume of sludge and **SRP-Reagent** into the **SRP-Reaction –Chamber** and mix it for 15 minutes.
- Transferring mixture into the SRP-Settling chambers and settled it for 30 minutes.
- Transferring supernatant (i.e SRP) into the SRP-Storage-Tank for further use in Water Treatment Process as "Recovered Alum".

- The settled sludge which is acidic in nature is transferred into the Lime-Mixing-Tank followed by disposal at Sludge-Drying-Bed.

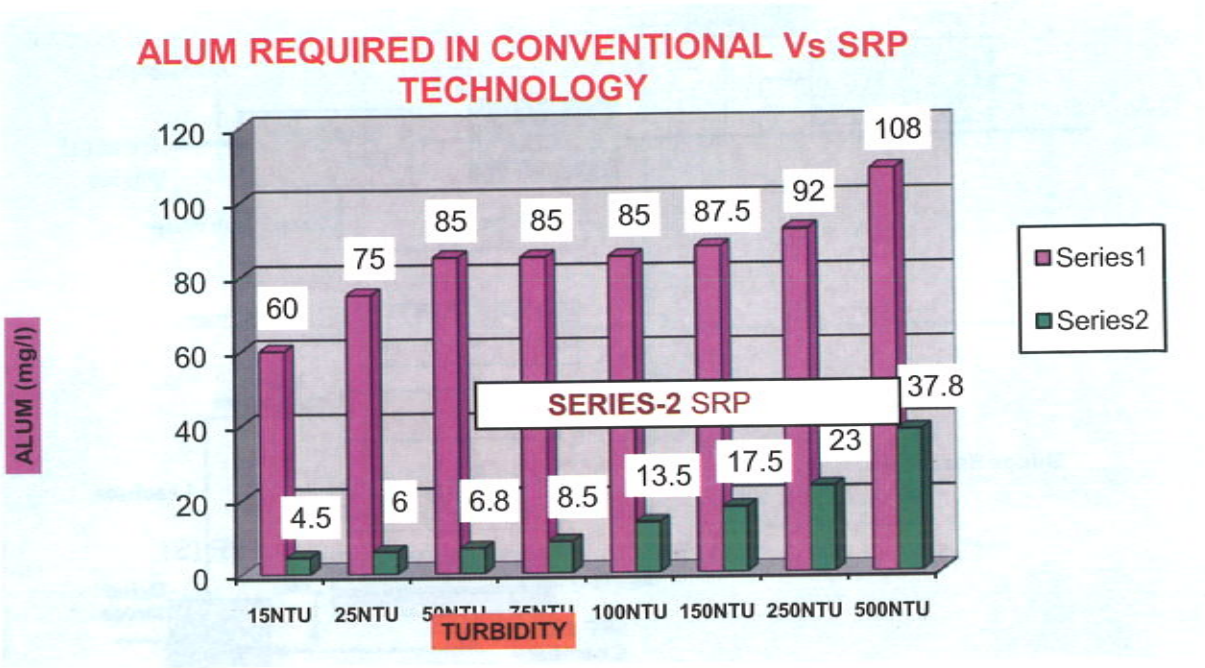


Figure 7.2 Alum requirement for raw water treatment at different NTU in Conventional Vs SRP technology treatment process

It has been found that fresh alum requirement in SRP technology varied from 7 to 30 % in comparison to Conventional technology. Thus, 93 to 70% of alum requirement is fulfilled by the recovered alum i.e. SRP

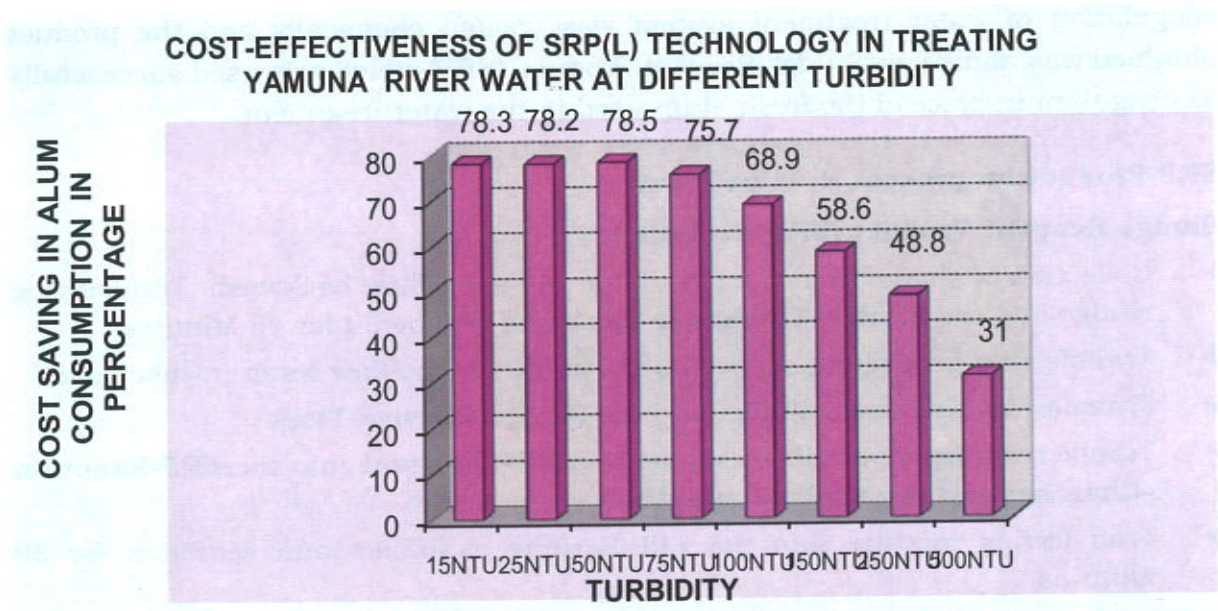


Figure 7.3 Cost saving in term of Alum consumption in SRP technology

It is observed that cost of saving ranged from 70 to 78% in comparison to conventional treatment technology. However, the treatment of raw-water with turbidity more than 500 NTU is not cost effective with SRP technology.

Advantages of SRP Technology

- Reduction in volume of sludge substantially.
- Reduction in alum consumption 70 – 90 %.
- Near 100% water recovery in comparison to conventional process, where 15-20% water loss along with sludge.
- Reduction in cost of treatment i.e. 40-60 %
- Zero wastewater discharge.
- Reduced pressure on the limited resources of raw material necessary for the production of alum.
- Save the Natural-Water-Bodies from alum contaminated sludge pollution.

7.2 MARKET FRIENDLY EMISSIONS TRADING SCHEME (ETS) FOR PARTICULATE MATTER IN STATIONARY SOURCES

The Pilot Project for Emission Trading Scheme for Particulate Matter has been initiated by Ministry of Environment and Forests (Govt. of India) initially for three States i.e. Gujarat, Maharashtra and Tamil Nadu. Central Pollution Control Board, State Pollution Control Boards (SPCBs) of Gujarat, Maharashtra and Tamil Nadu are participants in this project.

The different phases of the entire activity are outlined in the Table 7.1 :

Table 7.1 Emission Trading Scheme (ETS) for Particulate Matter in Stationery Sources – Various Phases

Project Phase Number	Name	Key Objectives
I	Design Phase	• Dialogue and concurrence • Initial Concept Note and Evaluation Design • Draft Continuous Emissions Monitoring Systems and Data Acquisition and Handling Guidelines • Selection of pilot project areas and industry based on available data and objective selection criteria • Field Trials of Continuous Emissions Monitoring Systems (CEMS)
II	Baseline Survey	• Baseline survey of industries • Analysis of data to estimate abatement costs, project benefits, health impacts, status of industry etc • CARE Center infrastructure in SPCBs • CEMS installation and evaluation • (CARE Center used to receive continuous emissions data from regulated industries)
III	Implementation Phase	• Training and capacity building, SPCBs • Regulatory notification enabling trading on pilot basis • Concurrent evaluation and documentation of pilot

Attempts are on to create a national resource group with respective linkages for overall implementation of the entire activity in a technically sound manner. The capacity building programs for calibration, auditing / certification of PM-CEMS besides uniform data acquisition, handling and validation are in progress.

PM-CEMS System

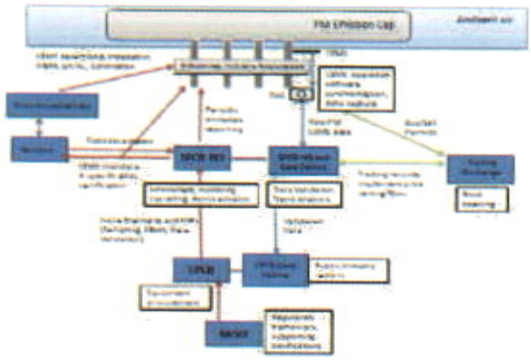


Fig 7.5 Systematic Diagram for Continuous Emission Monitoring System (CEMS)

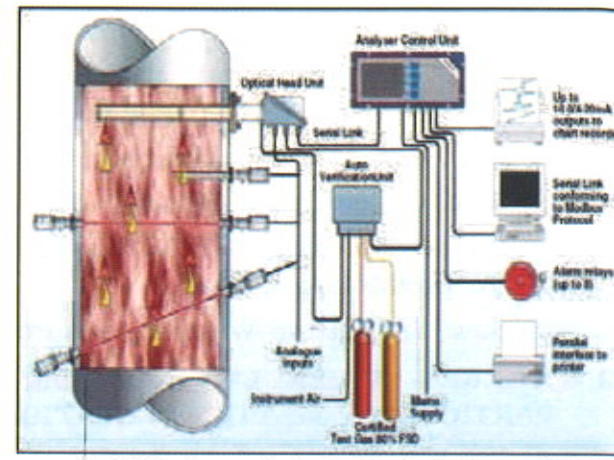


Fig 7.6 Continuous Emission Monitoring System (CEMS)

7.3 MEASUREMENT OF HAZARDOUS OROGANIC COMPOUNDS DIOXIN (PCDDs) AND FURAN (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 the purview of project, the following sub-activities have been executed by National Reference Trace Organics Laboratory of Central Pollution Control Board:

- **Monitoring of Dioxin – Furan in Stationary Source Emissions**

  The monitoring of Dioxin – Furan in stationary source emission at Incinerators of Treatment Storage and Disposal Facilities (TSDFs), Incinerators of organic chemical manufacturing units and Bio-medical waste incinerators have been undertaken on request of Hazardous Waste Management Division, State Pollution Control Boards, Pollution Control Committees etc.

- **National Ambient Air Dioxin Monitoring Program**

  Ambient air dioxin – furan monitoring program has been continued by National Reference Trace Organics Laboratory of Central Pollution Control Board at ten identified Critically Polluting Areas (CPAs) in the country in association with CPCB Zonal Offices at Bangalore, Kolkata and Vadodara.

Dioxin / Furan Source Emissions Monitoring

- **National Ambient Air Dioxin Monitoring Program**

Ambient air dioxin – furan monitoring program has been continued by National Reference Trace Organics Laboratory of Central Pollution Control Board at ten identified Critically Polluting Areas (CPAs) in the country in association with CPCB Zonal Offices at Bangalore, Kolkata and Vadodara.

Table 7.4 Ambient Dioxin/ Furan Monitoring at Critically Polluted Areas

S. No.	Monitoring Responsibility HQs / Zonal Offices	State	Identified Critically Polluted Areas for Monitoring
1.	National Reference Trace Organics Laboratory, HQs Delhi	Punjab	Ludhiana
		Uttar Pradesh	Ghaziabad
		Haryana	Bhiwadi
		Madhya Pradesh	Singrauli
		Chhattisgarh	Korba

2.	CPCB Zonal Office – Vadodara	Gujarat	Ankleshwar and Vapi
		Maharashtra	Chandrapur
3.	CPCB Zonal Office – Bangalore	Tamilnadu	Vellore
4.	CPCB Zonal Office - Kolkata	Orissa	Angul - Talchar

The 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 Areas (CPAs) on quarterly intervals.

During year 2012-2013, four quarterly Vapour phase and particulate phase samplings have been completed at remaining identified critically polluted areas. The collected vapour phase and particulate phase samples have been subjected to extraction of dioxin-furan from the sampling media and removal of interference organic compounds. The sample extracts after clean-up have been analysed by High Resolution Gas Chromatograph with High Resolution Mass Spectrometer (HRGC-HRMS) for Dioxin-Furan 17 congeners. The analytical data being compiled for Assessment of Status of Ambient Dioxin / Furan.

Extract Cleanup *Extract Concentration*

Dioxin / Furan samples Pre-treatment

High Resolution Gas Chromatograph – High Resolution Mass Spectrometer for Dioxin / Furan Analysis

7.4 COMPUTATION OF SOCIETAL RISK ABATEMENT COST AND LONG RUN MARGINAL FINANCIAL COST WITH REGARD TO DIOXIN AND FURAN EMISSION STANDARDS FOR COMMON HAZARDOUS WASTE INCINERATOR

Central Pollution Control Board undertook the study on 'Computation of societal risk abatement cost and long run marginal financial cost with regard to Dioxin and furans emission standards for common hazardous waste incinerator' as per the direction of MoEF. The primary purpose of this study was to determine the "break even" point for dioxin and furan emission standard, where emission control costs and societal costs are equal to each other, which could be considered "rational" as the societal costs justify the cost of control.

The experts which carried out the study have expressed that the "break even" point occurs at emission level of about 0.15 ng TEQ/Nm^3. This study was an attempt to develop a conceptual approach to consider societal cost as one of the determinants for setting an emission standard and not to justify or reject an existing standard. This is because the numbers are based on a variety of assumptions in absence of valid and reliable data and, hence, cannot be taken as sacrosanct. The societal costs calculated here are based only on mortality. The health impact has only considered mortality directly attributable to dioxin and furan. It does not include synergistic or antagonistic health impacts due to other pollutants in the ambient air. The project has been completed and document has been published. It is essential that while evaluating this study and/or considering utilizing it for framing of any policy, the limitations of the study have to be considered.

7.5 EVALUATION OF INDIGENOUS PM2.5 SAMPLER

MoEF has notified revised NAAQS (National Ambient Air Quality Standards) vide the Gazette Notification, Extraordinary, Part III, Section 4, No. 217 dated 16th November 2009, in which standards for 12 parameters have been laid. PM2.5 has been included in the list of parameters. The regulatory authorities and researchers are to select a suitable sampler for PM2.5 monitoring and adopt a proper methodology in the

country. To identify the technically sound and internationally comparable product CPCB has taken an initiative to evaluate the performance of using USEPA standard FRM sampler as PM2.5 samplers as reference for this investigation.

CPCB organized the evaluation programme as under:

- Organization of workshop involving the technical experts of Indian manufacturers.
- Understanding the technology used in indigenous samplers
- Study on performance evaluation:
  - Technical / Engineering comparison of indigenous samplers with respect to design criteria of USEPA Federal Reference Method (FRM).
  - Component wise performance evaluation for major and influencing parameters to achieve desired size cut and accuracy in flow control.
  - Collocated sampling by all the samplers (7 indigenous and FRM) was carried out for 24 days covering different seasons.
  - Statistical evaluation of data collected by each sampler among and within the data set.

➢ Three indigenous samplers passed the basic design criteria of PM10 (L 14) and PM2.5 (L 21) impactor as per FRM design. Majority of the indigenous samplers did not meet the basic design criteria of impactor.

➢ Two indigenous equipments met the criteria of acceptable deviations (± 10%) as prescribed in USEPA "Quality Control Guidelines 2.12" for evaluation of an FEM (Federal Equivalent Method) sampler.

➢ The summary of ANOVA test for PM2.5 values suggest that the variations among all were very significant, however. The situation did not improve even upon elimination of samplers, which were not meeting the design criteria.

➢ To find out the cause of significant variations among the 'design wise qualified samplers (3 indigenous and 1 FRM)', the data generated by one of the equipment from the entire matrix, having high bias was eliminated. This led to significant improvement in F value of test. The observation led into a conclusion that the performance of samplers meeting the bias criteria also fulfills the criteria to pass ANOVA for PM2.5 concentration.

➢ A similar conclusion was drawn for other reference operating parameters like flow consistency.

➢ Finally among the seven Indian vendors who submitted their instruments for comparative evaluation of their performance to CPCB only two samplers were found satisfactory from both design as well as operational point of view. However, these observations are strictly based on the data generated by collocated sampling and the model and components offered by the company.

➢ Although the performance evaluation exercise suggests that two indigenous samplers lie close to FRM, still there remains some scope of improvement in minor issues in both the samplers.

7.6 VOLATILE ORGANIC COMPOUNDS (VOCs) MEASUREMENT IN DRINKING/ SURFACE WATER SAMPLES BY PURGE AND TRAP GC-MS

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 chemicals are persistent, volatile, but less toxic than the chlorinated solvents. VOCs are very mobile and these may be dissolved and washed out with run off water reaching surface water resources and may also leach into the ground water.

During year 2012 – 2013, three rounds of monitoring have been undertaken by National Reference Trace Organics Laboratory of Central Pollution Control Board in ground and surface water locations at Most Critically Polluted Areas of country viz. Ankleshwar, Vapi (Gujarat), Ghaziabad (U.P.), Chandrapur (Maharashtra) and Korba (M. P.). The water samples collected have been analyzed for 43 VOCs by Purge & Trap concentration followed by GC-MS analysis using USEPA Method 524.2. The findings about VOCs observed at various critically polluted areas are presented in Table 7.5.

Table 7.5 : Volatile Organic Compounds (VOCs) identified in Ground / Surface Water Samples at Critically Polluted Areas (CPAs) during year 2012 – 2013

S. No.	Critically Polluted Area	Ground Water / Surface Water Samples			Percent VOC Contamination	Volatile Organic Compounds Identified / Observed	
		Total samples collected / Analyzed	Nos. without any VOC contamination	Nos. with VOC contamination		Volatile Organic Compound (VOC)	Maximum Concentration Observed
1.	**Ankleshwar** (Gujarat)	24	22	02	8.33	1,2 Dichloroethane	3.73
						1,2 Dichlorobenzene	7.50
2.	**Vapi** (Gujarat)	24	22	02	8.33	Trichloromethane	3.30
						1,2 Dichloroethane	10.32
						Toluene	36.40
						1,1,1,2 Tetrachloroethane	12.54
3.	**Ghaziabad** (Uttar Pradesh)	66	65	01	1.52	1,1 Dichloroethane	7.04
						Trichloroethylene	203.80
4.	**Chandrapur** (Maharashtra)	72	70	02	2.78	Methylene chloride	16.96
						Trichloromethane	4.66

S. No.	Critically Polluted Area	Ground Water / Surface Water Samples			Percent VOC Contamination	Volatile Organic Compounds Identified / Observed	
		Total samples collected / Analyzed	Nos. without any VOC contamination	Nos. with VOC contamination		Volatile Organic Compound (VOC)	Maximum Concentration Observed
5.	**Korba** (Chhattisgarh)	47	38	09	19.15	Dichloromethane	57.50
						Tert-butylebenzene	3.30
						1,3 Dichlorobenzene	3.26
						1,4 Dichlorobenzene	1.85
						1,2 Dichlorobenzene	4.38
						1,1,2,3,4,4 Hexachlorotoludine	9.21

7.7 ASSESSMENT OF POLY-CHLORINATED BIPHENYLS (PCBs) IN WATER AND BOTTOM SEDIMENTS OF RIVER YAMUNA IN DELHI

Polychlorinated Biphenyls (PCBs) are chlorinated organic compounds with one to ten chlorine atoms attached to biphenyl molecule. 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 bottom sediments of river Yamuna in Delhi have been undertaken on quarterly basis by National Reference Trace Organics Laboratory of Central Pollution Control Board during the year 2012-2013. 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 (28 congeners) in Yamuna River bottom sediment samples in Delhi varied from 0.051 µg/kg to 3.060 µg/kg with the mean of 0.631 µg/kg. The Total PCBs analyzed in river water have been found Below Detection Limit most of the time except once (0.005 µg/l) at Rajghat monitoring location, while in river sediments also, the Total PCBs have been found very low and were well within the Total PCBs Guidelines value of 227 µg/kg of United States. The contamination of PCB congeners in sediments samples may be due to confluence of untreated or partially treated domestic / industrial wastewater through several drains in the river.

7.8 MONITORING OF PESTICIDE RESIDUES AT NATIONAL LEVEL - SPONSORED PROJECT BY MINISTRY OF AGRICULTURE, NEW DELHI

Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, New Delhi and nodal department i.e. Project Coordinating Cell, All India Network Project

(AINP) on Pesticide Residues, Indian Agricultural Research Institute New Delhi has been continuously sponsoring a project "Monitoring of Pesticide Residue at National Level" to Central Pollution Control Board, Delhi since October, 2006.The objective of the study 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 & Bagpat), Haryana (Sonepat, Faridabad & Ballabhgarh) and Delhi (Alipur Block, Kanjhawala Block, Najafgarh & Nizamuddin Bridge). During the year, the Monitoring of Pesticide Residue has been undertaken on monthly basis in about 70 surface water samples. The following groups of Pesticides being monitored on monthly basis:

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

Pesticide Extracted Samples Concentration by Rotary Vaccum Evaporator

The study indicated that only 3% of Total surface water samples (750 Nos.) analyzed have been found with pesticides residues above limit (0.5 ppb), while in remaining surface water samples the pesticides contamination was either absent or below the limit (0.5 μg/l).

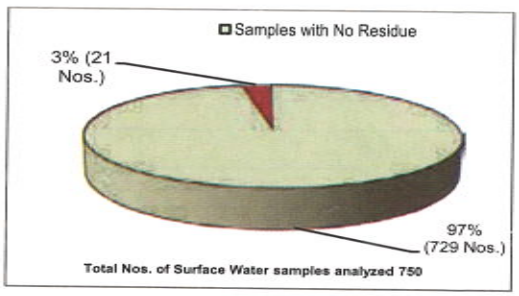


Figure 7.4 : Summary of Pesticides Analysis in Surface Water Samples in National Capital Region (NCR – Delhi)

7.9 METHODOLOGY, DEVELOPMENT AND STANDARDIZATION OF TRACE ORGANIC PARAMETERS (PHENOLS AND PHENOLIC COMPOUNDS)

Phenols and phenolic compounds are of widespread use in many industries and often found in wastewaters from coal gasification, coke-oven batteries, refinery and petrochemical plants and from the production of various pesticides. The USEPA has designated 11 Phenolic compounds as Priority Pollutants namely Phenol, 2-Chlorophenol, 2,4-DichloroPhenol, 2,4,6-TriChloroPhenol, Pentachlorophenol, 2-Nitrophenol, 4-Nitrophenol, 2,4-Dinitrophenol, 2-Methyl, 4,6-dinitrophenol, 2,4-Dimethylphenol, 4-Chloro-3-methylphenol. These are commonly used as preservatives, disinfectants, in pulp processing, in the manufacture of pesticides and other intermediates. These priority phenols are now common environmental pollutants found in water, sediments and soil. Many priority phenols, especially the Chlorophenols are known for their toxicity, carcinogenicity, and persistence in the environment.

There are methods, which have been developed over the years for the determination of Phenolic compounds in environmental samples such as water and waste water. The determination of 11 priority pollutant phenols at low levels are usually undertaken by High Performance Liquid Chromatography with UV detection. Central Pollution Control Board undertaken an in-house development project "Methodology, Development and Standardization of Trace Organic Parameters (Phenols and Phenolic compounds)" using HPLC combined with ultra violet- diode array detector (UV-DAD Detector). The analytical methodology for Phenol & Phenolic compounds has been standardized adopting following HPLC operating conditions:

Analytical Column	:	Ascentis C18 (25cm X 4.6mm with 5µm film)
Auto Injection	:	22µl sample Loop
Mobile Phase	:	Gradient flow of 80% of 0.1% H3PO4 and 20% 0.1% H3PO4 Methanol in 60 min
Flow Rate	:	0.7 mL/min
Detector	:	UV-DAD at 280 nm.

Table 7.6 : Quality Control / Quality Assurance during Analytical methodology development for Phenol & Phenolic Compounds (HPLC Method)

Phenolic Compounds	LOD (µg/L)	Correlation (R2)	Recovery (%)	Std Dev (±%)
Phenol	0.23	0.9997	41-43	2.28
4-Nitrophenol	0.16	0.9997	59-62	1.75
2,4-Dinitrophenol	0.08	0.9996	99-102	9.40
2-Nitrophenol	0.07	0.9997	84-93	4.64
2-Chlorophenol	0.20	0.9997	90-100	5.90
2,4-Dimethylphenol	0.19	0.9998	97-102	4.61

2-Methyl, 4,6-Dinitrophenol	0.20	0.9997	97-101	9.55
4-Chloro, 3-Methylphenol	0.13	0.9997	94-98	5.81
2,4-Dichlorophenol	0.35	0.9998	83-89	4.81
2,4,6-Trichlorophenol	0.11	0.9998	93-95	7.83
Pentachlorophenol	0.40	0.9995	92-101	11.11

Standardization of Methodology for Phenol & Phenolic Compounds by High Performance Liquid Chromatograph (HPLC)

7.10 ASSESSMENT OF PERSISTENT ORGANIC POLLUTANT RESIDUES (POP's) IN HUMAN POPULATION OF DELHI WITH SPECIAL REFERENCE TO ADVERSE HEALTH EFFECTS AND MORBIDITY (COLLABORATIVE PROJECT BETWEEN CPCB AND UCMS & GTB HOSPITAL)

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 such as Organo chemicals viz. DDT, Aldrin, Dieldrin, Endrin, Chlorodane, Heptachloro, Mirex Texaphene; industrial chemicals, like PCBs, 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 Persistent Organic Pollutants 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 due to exposure. The hormonal changes during pregnancy, lactation

and menopause, mobilizes the bio-accumulated pollutants in the body. The organo-chlorine pesticides can interfere in normal endocrine system, resulting into reproductive disorders and breast cancers.

The study has been undertaken by Central Pollution Control Board since 2008-2009 onward 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 Persistent Organic Pollutants residues and Poly-chlorinated Biphenyls. The salient objectives of the project are:

- 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, organo-chlorine 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 with Perkin Elmer 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.

7.11 CO-PROCESSING OF WASTES IN CEMENT KILN

Central Pollution Control Board (CPCB) initiated the concept of "Co-processing of waste in cement kiln" which has emerged as the best environment friendly option for disposal of waste as it reduces its carbon foot print besides enabling conservation of fossil fuel and raw material. Under provision of Rule 11 of the Hazardous Wastes (Management and Handling & Transboundary Movement) Rules, 2008 CPCB has been empowered to issue permissions for utilization of hazardous waste for resource recovery or energy recovery.

CPCB received various applications under Rule 11 of the Hazardous Wastes (Management and Handling & Transboundary Movement) Rules, 2008 from cement plants for granting permission for co-processing of different kind of wastes in cement kiln. Various trial runs were conducted during the year 2012-2013 and based on satisfactory performance of trial runs, cement manufacturing units have been granted permission for co-processing of following categories of wastes.

- Organic plating sludge & dyeing sludge (Metal zippers Manufacturing Industry)
- Grinding waste, oil soaked cloth & ETP sludge (M/s Gillete India Ltd., Bhiwadi)
- Benzofuran (Kumar Organic Product Ltd)
- Chemical ETP sludge (M/s Syngenta India Limited, Goa)
- Liquid waste mix (M/s Bharuch Enviro Infrastructure Ltd., Ankleshwar, Gujarat)
- Spent carbon
- Solid waste mix (Shivalik Solid Waste Management Ltd., Nalagarh)
- PTA waste mix (M/s MCC PTA India Corporation Pvt. Ltd., West Bengal)
- CETP sludge of Jodhpur Pradushan Niwaran Trust
- Organic Residue
- Spent clay
- CETP sludge (Pali)
- ETP Sludge (Textile industry)

The successful trial runs indicate that all the above mentioned wastes are compatible for co-processing in cement kiln.

7.12 R&D PROJECT ON OPTIMISATION OF CHROME TANNING

Central Pollution Control Board Zonal Office-Lucknow initiated R&D Project on Optimisation of Chrome Tanning as a joint endeavor with M/s Super Tanneries, Jajmau, Kanpur. The Project Scope includes Process and Chemical interventions to optimize absorption of chromium in the tanning process. In all the operations Process and Chemical optimization have to be undertaken by observing following steps:

- **Step 01:** Execution of Conventional process with no chemical / process intervention
- **Step 02:** Process wherein, conventional de-liming agents (ammonia salts) are substituted and other chemical interventions are incorporated but without improvisation in tanning drum and their configuration
- **Step 03:** Same as Step 02 but accompanied with improvisation in tanning drum and their configuration

The Study includes testing of parameters - pH, COD, TDS, alkalinity, chloride and total Chromium in process-specific wastewater, and physico-chemical properties in tanned hide/side. Experimental set-up of the tannery has been utilized for the study. Analysis of wastewater samples has been undertaken at CPCB Zonal Office Lucknow laboratory, while characterization of processed hides has been undertaken at the tannery.

Three phases of experiments were completed during the year. Chromium uptake of 80 % has been achieved. Results validation / reproducibility will be undertaken further.

7.13 MUNICIPAL SOLID WASTE MANAGEMENT:

Central Pollution Control Board (CPCB) is co-ordinating with the State Pollution Control Boards (SPCBs)/Pollution Control Committees (PCCs) for implementation of the Municipal Solid Wastes (Management and Handling) Rules, 2000 in States/ Union Territories and followed up for the Annual Reports on implementation of the MSW Rules. The Consolidated Annual Review Report for the year 2010-11 was prepared based on information received from 22 SPCBs/PCCs and submitted to MoEF in September, 2012. In addition, 18 public complaints related to violation of MSW rules were received from various states were disposed through the concerned SPCBs/PCCs during 2012-13.

CPCB followed up with SPCBs/PCCs for completion of the long pending demonstrative projects awarded during 2004-05 at 10 towns/cities Viz. Chandigarh, North Dum Dum & New barrackpore (West Bengal), Udumalpet (Tamil Nadu), Kohima (Nagaland), Mandi (Himachal Pradesh), Suryapet (Andhra Pradesh), Itanagar (Arunachal Pradesh), South & West Sikkim Districts (Sikkim), Jalna (Maharashtra) and Agartala (Tripura). Such project of Mandi (HP), Agartala (Tripura) and North Dum Dum (WB) have been completed during the current year 2012-13. The scheme at Itanagar has been terminated mutually due to inclusion in the JNNURM programme. The schemes at other places are being followed up for early completion.

STUDY PROJECT ON MSW MANAGEMENT

To facilitate implementation of the MSW Rules, CPCB took initiatives for a few study projects as under;

(i) Remote Sensing/GIS Study for identification of municipal landfill sites:

This Remote Sensing/GIS based study was undertaken in 2009 in Karnataka through KSRASAC, Andhra Pradesh through APSRAC and in NCR-Delhi through BISAG, Gandhinagar and the concerned SPCBs. With the co-ordination of the concerned SPCBs, the studies have been completed in the above areas and report received on NCR-Delhi and Karnataka. However, report from Andhra Pradesh is in the final stage of preparation.

(ii) Landfill Monitoring projects:

CPCB sponsored the landfill monitoring projects (during 2008) to Assam, Meghalaya, Andhra Pradesh and Himachal Pradesh for assessing Groundwater, ambient air, leachate and compost quality including the compliance verification. The activities under the study are mandatory for SPCBs under the MSW rules, 2000. The study projects were executed through respective State Boards. CPCB followed up with SPCBs for execution of the project. The project for Assam State Pollution Control Board is under finalization stage. The study is on-going in the remaining 3 states.

(iii) Complete Utilization of MSW including inert:

CPCB sponsored the study to CBRI-Roorkee during the year 2010. The study project has been completed by CBRI and submitted the report during the year 2012-13. It is observed in the study that Municipal solid wastes can be utilized completely by way of composting (organic matter), recycling (recyclable plastics, paper, wood, etc.) and utilizing inert for making bricks, tiles, pavement blocks, etc. In the process, only 10% of the MSW remains for landfill disposal. Thus, municipal solid wastes reduces to 'Zero Garbage' and the requirement of landfill is minimized.

(iv) MSW Management in Hilly areas:

CPCB through NEERI-Nagpur has initiated the study during 2010-11 for assessing management of MSW in Hilly areas of NE-States including Himachal Pradesh and Uttarakhand. The objective of the study was to suggest facilities for MSW management considering hilly areas as special case for implementing the MSW Rules; which characterized by heavy rainfall, steep slopes, loose soil, narrow roads, low temperature, etc. The study is followed up and brought to the final stage of completion during the year 2012-13 and will be completed in 2013-14.

BIOREMEDIATION PROJECTS

Bioremediation technique is often observed in curbing the problem of oil sleek, hazardous site reclamation, radioactive sludge removal, boosting of STP function, lake conservation, Groundwater reclamation, odor suppression, etc. In these processes, specific categories of microbial consortia are used for application and treating the impurities. In view of quantum gap in between Sewage generation and treatment facilities, CPCB formulated the concept of In-situ treatment of sewage in open drains. The microbial consortia designed by various agencies were examined and conducted pilot studies in Ramnagar-Domora Drain of Bharatpur (Rajasthan) and AB Road Drain, Indore (Madhya Pradesh). The study revealed that In-situ Bioremediation can reduce pollution load up to 50% in terms of BOD, COD and TSS. Also, it is observed that technology is cheaper than conventional treatment, which doesn't involve any skilled manpower, heavy machineries, electricity and other recurring cost. Other such Bioremediation projects are also on-going in Budha Nala, Ludhiana (Punjab) and Bakarganj Nala, Patna (Bihar) under NGRBA/NRCD programme of MoEF during the year 2012-13.

Kerb Block from Inert

Auto Van for Garbage collection, Mandi

Push cart- at Mandi Project

Mechanical Sweeper at Chandigarh

Front loader at Mandi

Microbial Dosing at Ramnagar-Domora Drain, Bharatpur

7.14 BIOREMEDIATION PROJECTS

Bioremediation technique is often used in curbing the problem of oil sleek, hazardous waste site reclamation, radioactive sludge removal, boosting of STP function, lake conservation, Groundwater reclamation, odor suppression, etc. In these processes, specific microbial consortia are used for application and treating the impurities. In view of quantum gap in between Sewage generation and treatment facilities, CPCB formulated the concept of In-situ treatment of sewage in open drains. The microbial consortia designed by various agencies were examined and conducted pilot studies in Ramnagar-Domora Drain of Bharatpur (Rajasthan) and AB Road Drain, Indore (Madhya Pradesh). The study revealed that in the In-situ Bioremediation stretch pollution load in terms of BOD, COD and TSS was reduced up to 50%. The technology is cheaper and doesn't involve any skilled manpower, heavy machineries, electricity and other recurring cost. Other such Bioremediation projects are on-going in Budha Nala, Ludhiana (Punjab) and Bakarganj Nala, Patna (Bihar) under NGRBA/NRCD programme of MoEF.

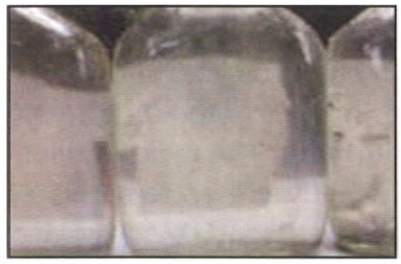
Treated water quality at Final Discharge, Bharatpur

V-Notch for measuring flow, Bharatpur

Before, AB Road Drain, Indore

Dosing with spray

Dosing with perforated pipes, AB-Road Drain, Indore



Treated sewage at discharge point, Khan River

Metal Screen at Budha Nala, Ludhiana

First Green Bridge Installed at Budha Nala, Ludhiana

7.15 COLLABORATIVE PROJECT ON GROUND WATER REMEDIATION

Central Pollution Control Board Zonal Office Lucknow has been executing a collaborative Project " Geo-environmental Investigation and pilot scale remediation of soil and groundwater in Rania-Khanchandpur area, Distt. Kanpur Dehat (Rural). The project is being executed in collaboration with Central Ground Water Board (CGWB) Northern Region, Lucknow. In accordance to the Project Terms of Reference, salient activities completed are detailed as under :

a. Intensive groundwater monitoring in study area

b. Drilling and development of strata-specific piezometers

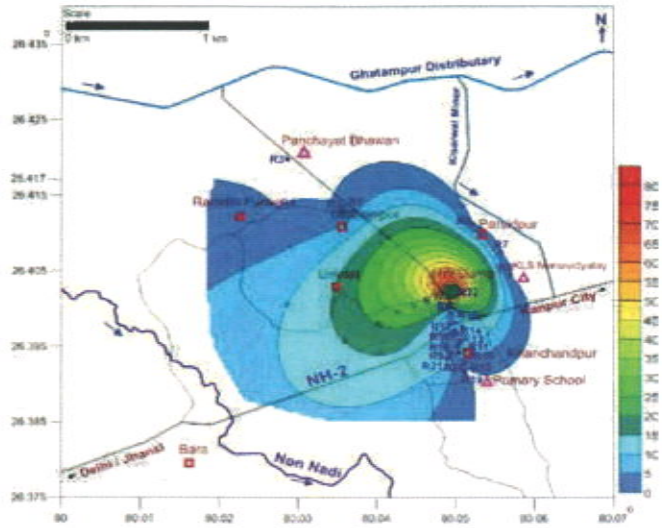
c. Development of groundwater quality profile for hexavalent chromium

d. Ground survey and benchmarking of 30 locations reduced to mean sea level

e. Digitization of study area map on 1:25000 scale

f. Preparation of iso-concentration (isopleths) map for critical parameters

7.16 ANALYSIS OF AOX FROM SELECTED INDUSTRIAL EFFLUENTS USING AOX ANALYZER



*Concentration depicted in isopleths are in mg/l

Hexavalent Chromium* isopleths in Study Area
(Map to-the-scale 1:25000)

Adsorbable organic halides (AOX) are the organic compounds having bounded with halides viz. Chlorine, Bromine, Iodine. These are generated majorly from 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 are recalcitrant and have long half-life periods. Some of these show a tendency to bioaccumulate, while some are proven carcinogens and mutagens. Hence, it is important to generate reliable data on chlorinated compounds (AOX) discharged through the effluent of Pulp and paper units in India. The measurement of these compounds could be achieved by adsorption of the effluent on to activated carbon and combustion and titration of the adsorbed carbon using AOX Analyzer.

This ongoing study "Analysis of AOX from selected industrial effluents" 5 identified units of Pulp and Paper from U.P and Haryana involved in bleaching process for whitening of Pulp, were monitored and the samples collected were analyzed to assess AOX generation from these units. The findings are presented in Table 7.7 and Figure 7.8

Table: 7.7 AOX in Industrial Effluent generated from selected units of Pulp & Paper

Units	ETP INLET in mg/l	ETP OUTLET in mg/l	in Kg/Ton
Unit - 1	7.12	0.96	0.04
Unit - 2	7.9	2.3	0.07
Unit – 3	16.40	2.60	0.1
Unit – 4	19.20	8.65	0.5
Unit - 5	11.75	5.60	0.3

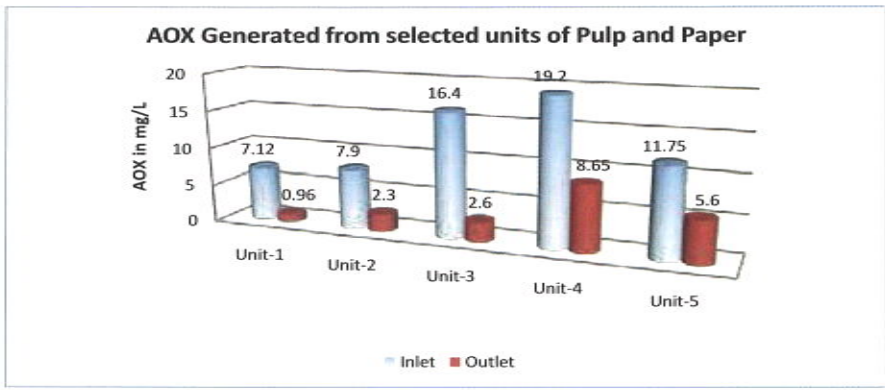


Figure: 7.8 AOX Generated from selected units of Pulp and Paper

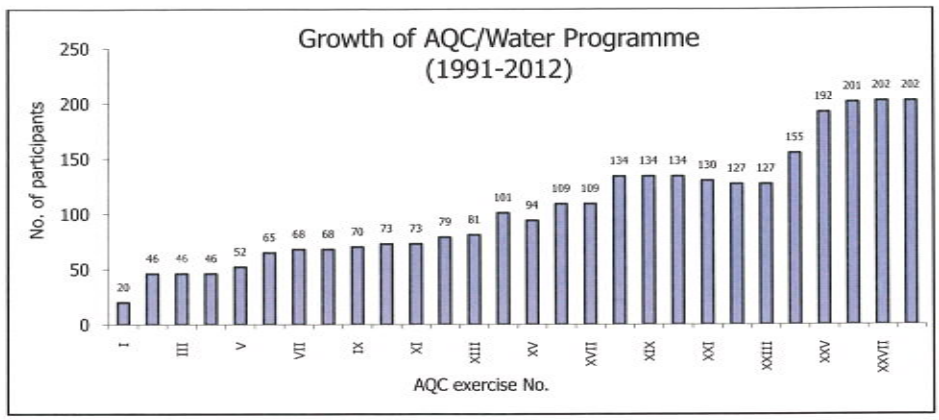
Except Unit-2 and Unit-3 all other three units are Large Pulp and Paper units and found well within the prescribed standard of AOX i.e. 1Kg/Tonne of paper produced and in the range of 0.04 to 0.5 Kg/Tonne. The two small pulp and paper are also generating AOX in Effluents within the prescribed limit (2 Kg/Tonne) from 0.07 to 0.1 Kg/Tonne.

As the wastewater samples were collected from the outlet of Effluent Treatment Plants of identified Pulp and Paper units as grab samples, therefore the results cannot be interpreted as the actual disposal of AOX from the industry, however an idea of AOX generation per tonne of bleached pulp can be inferred from the results.

7.17 ANALYTICAL QUALITY CONTROL (AQC/WATER) FOR CENTRAL AND STATE POLLUTION CONTROL BOARDS, POLLUTION CONTROL COMMITTEES AND FOR LABORATORIES RECOGNISED UNDER E.P. ACT.

An important mandate of 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. 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.

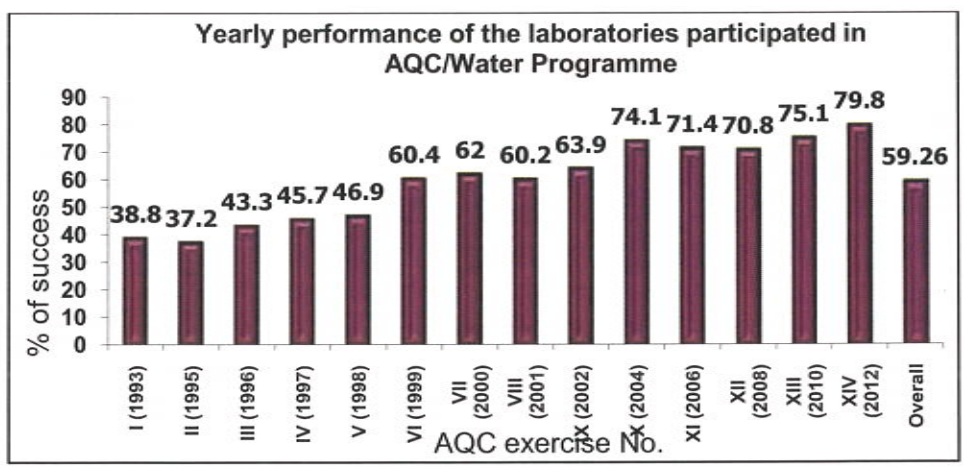
To ensure the reliability of the data, a programme called "Analytical Quality Control (AQC)" was initiated with 20 laboratories in 1991. In 2011-12, number of laboratories participated in this exercise have reached to 220 laboratories of SPCB/PCC, The Environment (Protection) Act 1986 recognized laboratories. As on 22nd April 2012, twenty eight 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 has been around 80%.

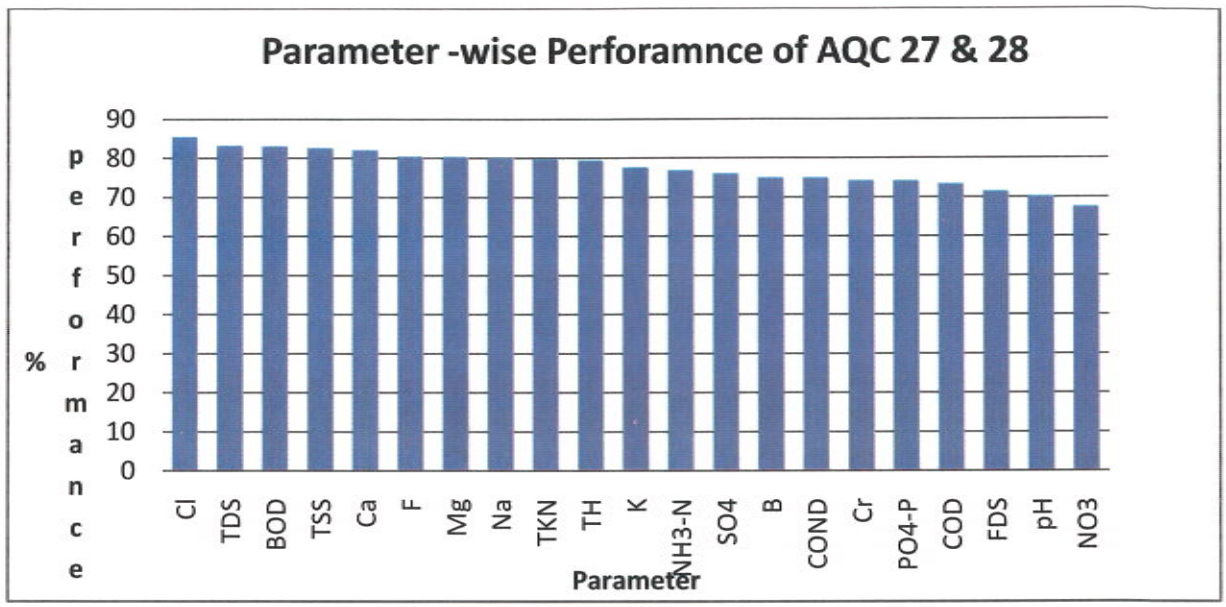


Two synthetic samples labeled as A & B, 1 litre volume each prepared in laboratory by adopting standard procedures and precautions are distributed to all participating laboratories by Courier service to avoid any transport delay. Samples were also analyzed in CPCB laboratory for arriving at "Reference value" for comparison and to estimate the acceptable limits of the reported values.

Table 7.8 Water Quality Parameters Covered under AQC/Water Programme (27th & 28th Exercise) by CPCB- Delhi 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		





Recommendations for AQC Scheme

The overall findings of the performance of AQC exercises reveal that Internal AQC system in all the laboratory is to be strengthened. The analytical capability of SPCBs/ PCCs laboratories could be improved by adopting the following major steps.

- Strengthening of the Internal AQC System
- Periodic calibration of instruments
- Using good quality chemicals and providing adequate quantity of glassware
- Providing good quality distilled water
- Improving the laboratory work atmosphere
- Providing analytical training to laboratory analysts.
- Adopting good quality assurance system
- Participation in Inter-laboratory AQC exercises by all laboratories of Pollution Control Boards and Committees.

7.18 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 HQs and five Zonal Office Laboratories (Lucknow, Vadodara, Bangalore, Kolkata and Bhopal) have participated in International Proficiency Testing (PT) programme conducted by M/s Environmental Resource Associates (ERA), USA (A Waters company) during October/ November, 2012 with coverage of various Physico-chemical, Microbiological, Chemical, Trace organics metallic parameters, and Air parameters. In addition, the National Reference Trace Organics Laboratory has also participated in International PT Programme for Dioxin & Furan conducted by Centre D'Expertise En Analyse Environmental Du Quebec, Canada and achieved good performance. The performance of the laboratories in the International PT programme is presented in Table below:

Table7.9 : Performance of Central Pollution Control Board HQs in Proficiency Testing / Inter Laboratory Calibration Participation

EQAS/ PT providers (or) ILC/ coordinating laboratory	PT Programme No.	Parameters	Z Score/ En Value / SDI
AIR LABORATORY			
M/s ERA (A Waters Company) 16341, Table Mountain Parkway Golden CO 80403 United States of America Air and Emissions Proficiency Testing program	AE-22 2009TNI (Nov / Dec 2012)	Arsenic (AE Metals on Filter Paper)	-1.3
		Cadmium (AE Metals on Filter Paper)	-0.958
		Chromium (AE Metals on Filter Paper)	-1.12
		Copper (AE Metals on Filter Paper)	-0.633
		Lead (AE Metals on Filter Paper)	-1.19
		Manganese (AE Metals on Filter Paper)	-1.34
		Nickel (AE Metals on Filter Paper)	-1.07
		Zink (AE Metals on Filter Paper)	-0.909
		Sulfur dioxide (AE Sulfur dioxide in Impinger Solution)	1.4
		Particulate matter (AE Particulate Matter on Filter Paper)	1.07
BIO-SCIENCE LABORATORY			
M/s ERA (A Waters Company) 16341, Table Mountain Parkway Golden CO 80403 United States of America	WS 108/150 October, 2012	Total Plate Count	3.13
		Presence-Absence test for Total Coliform	Excellent
		Total Coliform	1.9
		Fecal Coliform	1.57

EQAS/ PT providers (or) ILC/ coordinating laboratory	PT Programme No.	Parameters	Z Score/ En Value / SDI
Central Pollution Control Board, Bio-Science Laboratory, Parivesh Bhawan, East Arjun Nagar, Delhi-110 032	ILC February, 2013	Acute Lethal Toxicity	Good
		Bio-Monitoring of Water Quality	Good
INSTRUMENTATION LABORATORY			
M/s ERA (A Waters Company) 16341, Table Mountain Parkway Golden CO 80403 United States of America Water Proficiency Testing	WP 108150 October, 2012	Antimony	-1.06
		Arsenic	-0.481
		Cadmium	-0.861
		Chromium	-1.8
		Cobalt	-1.42
		Copper	-0.62
		Iron	-0.712
		Lead	-0.157
		Manganese	-0.241
		Nickel	0.313
		Selenium	-1.5
		Vanadium	-1.03
		Zinc	0.112
		Mercury	-2.84
		TOC	-0.34
NATIONAL REFERENCE TRACE ORGANICS LABORATORY			
M/s ERA (A Waters Company) 16341, Table Mountain Parkway Golden CO 80403 United States of America Water Proficiency Testing	WP 108 / 150 October, 2012	**Organo-Chlorine Pesticides (OCP)**	
		4,4'-DDE	-2.54
		4,4'-DDT	0.515
		Aldrin	-2.23
		alpha-BHC	-0.637
		beta-BHC	-0.706
		delta-BHC	-1.3
		Dieldrin	-1.15
		Endosulfan sulfate	0.246
		gamma-BHC(Lindane)	-0.929
		Heptachlor	0.511
		Organo-Phosphorous Pesticides (OPP)	
		Chlorpyriphos	3.95
		Dimethoate	-0.889
		Ethion	1.46
		Malathion	1.34
		Methyl Parathion	1.36
		Poly-chlorinated Biphenyls (PCBs)	
		Aroclor 1242	Concern

7.19 RECOGNITION OF LABORATORIES UNDER THE ENVIRONMENT (PROTECTION) ACT, 1986

Central Pollution control board, Delhi has been delegated the powers by Govt. of India vide Gazette Notification No. 145 (E) dated February 21.1991 for recognition of Environmental laboratories of Govt./Semi Govt. organization public sector undertaking and Educational Institutions under section 12(1)(b) & 13 to carry out the function entrusted to the Environment laboratories under the Environment (Protection) Act, 1986.

7.19.1 Expert Committee for Recognition of Environmental Laboratories

Ministry of Environment & Forest vide letter no Q-150187/8/2006-CPW dated 28.1.2009 has constituted the Expert Committee at CPCB Delhi for operationalization/ adoption of revised Guidelines for recognition of Environmental laboratories under the Environment (Protection) Act, 1986. All the proposals pertaining to Govt./ Private Environmental Laboratories are scrutinized for new/renewal of recognition and observations /comments are placed to Expert Committee of CPCB. The Central Pollution Control Board has organized seven meetings of Expert Committee during the year 2012-2013 for assessment, review and recommendation of cases of private/ government laboratories for recognition.

7.19.2 Participation in joint inspection of private and government laboratories for consideration of new/renewal of recognition under the Environment (Protection) Act, 1986

Central Pollution Control Board participated in joint inspections of twenty (20) private laboratories along with Ministry of Environment & Forest (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 also coordinated & participated in joint inspection of government sector laboratories along with State Pollution Control Board/ CPCB Zonal Offices for consideration of their recognition under the Environment (Protection) Act, 1986 during the year.

7.20 Receipt and Registration of Environmental Samples

Environmental samples collected under various projects, programmes i.e.NWQMP, NAAQMP, ESS , MSW and HWMP by Central Pollution Control Board-HQs, Zonal Offices of CPCB & SPCB are received at Central Sample Receiving window and registered before processing and analysis. During the year 2012-2013 total 4684 samples were received and registered for analysis:

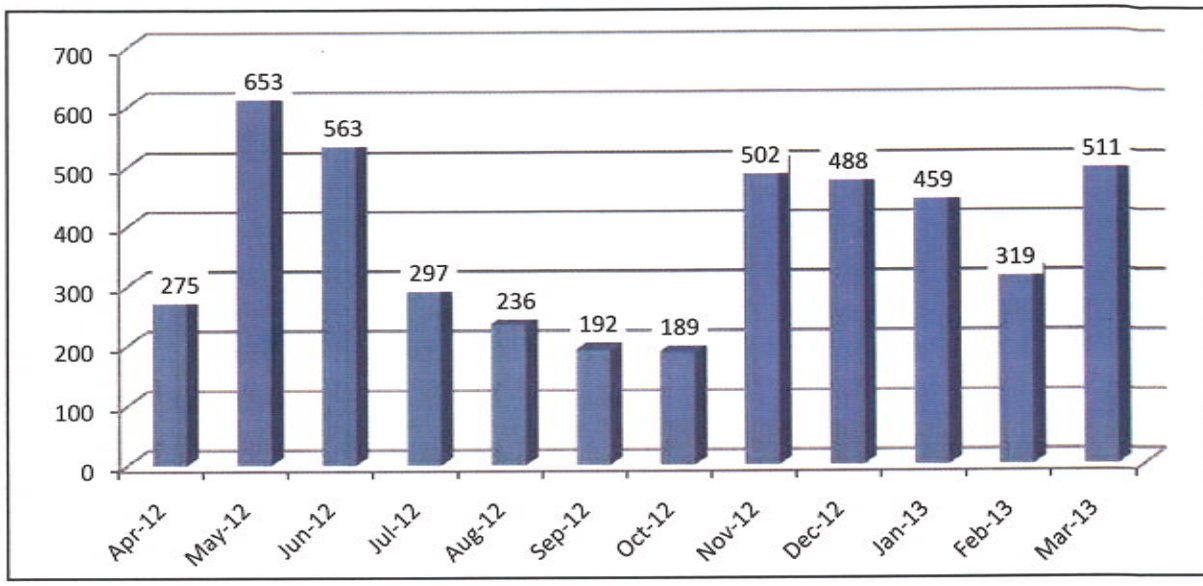


Figure: 7.11 Month wise receipt of Environmental samples at Central Laboratory CPCB, HOs- Delhi

7.21 Renewal of Accreditation of Laboratories of CPCB, Delhi (ISO/IEC 17025)

To have better quality and system management in Central laboratories in CPCB, laboratory accreditation by National Accreditation Board for Testing and Calibration of Laboratories (NABL), Department of Science and Technology (DST), India for criteria ISO/IEC17025 was first received in 2004. Further accreditation was accredited in subsequent years i.e. 2007 and 2009. The laboratories of CPCB were assessed in the year 2012 by NABL, DST, India for the renewal and granted the accreditation in accordance with the standard ISO/IEC17025 in the field of chemical and biological testing. The Accreditation Certificates from NABL (DST) New Delhi are reproduced in Figure 7.12.

NABL
National Accreditation Board for Testing and Calibration Laboratories
Department of Science & Technology, India
CERTIFICATE OF ACCREDITATION
CENTRAL POLLUTION CONTROL BOARD, CENTRAL LABORATORY
has been assessed and accredited in accordance with the standard
ISO/IEC 17025:2005
for its facilities at
(East Arjun Nagar, I.T.O. & Delhi College of Engineering) Delhi
in the discipline of
CHEMICAL TESTING

NABL
National Accreditation Board for Testing and Calibration Laboratories
Department of Science & Technology, India
CERTIFICATE OF ACCREDITATION
CENTRAL POLLUTION CONTROL BOARD, CENTRAL LABORATORY
has been assessed and accredited in accordance with the standard
ISO/IEC 17025:2005
for its facilities at
Parivesh Bhawan, East Arjun Nagar, Delhi
in the discipline of
BIOLOGICAL TESTING

Figure 7.12 NABL Laboratory Accreditation Certificate as per (ISO /IEC17025) for Central Pollution Control Board, Central Laboratory

Chapter VIII

ENVIRONMENTAL TRAINING

8.1 Environmental Training Unit (ETU) of CPCB

Environmental Training Unit (ETU) of Central Pollution Control Board organized and completed 19 training programmes through various training/R&D institutes during the year 2012-13 in various priority areas of the environment. The following training programmes were identified and conducted:

- Artificial Recharge to Ground Water and Water Harvesting Techniques – Policy Issues
- Laboratory Quality System, Management and Internal Audit as per ISO/ IEC 17025:2005
- Green Chemistry and Clean Technology
- Air Dispersion Modelling and Source Apportionment Based on Receptor Modelling
- Methodology/Technique of Source Emission Monitoring and Corrections to be Applied
- Noise Monitoring and Control Techniques
- Advanced Instrumentation Techniques
- Zero Liquid Discharge (ZLD) in Agro Based Industries
- Remediation Technology and Modelling of Assessment of Ground Water Contamination
- Environmental Aspects & Mitigation Planning for Pharma and Chemical Sector
- Monitoring & Analysis of VOC's in Water and Waste Water, Ambient Air and Emissions
- Environmental Data Interpretation, Compilation, Analysis, Presentation and Reporting
- Wastewater Treatment and Reuse in Industrial Sector
- EIA Studies & EMP of Contaminated Sites for Industrial Sector
- Bacteriological Techniques for Water and Wastewater Analysis and Quality Assurance

- Effluent Treatment Technologies in Dairy Industries
- Methodology of Assessment of Indoor Air Quality and Standards
- Operating Mechanism and Performance Evaluation of CETPs/STPs and CBMWTF
- Occupational Health & Safety Management System OHSAS (18001:2007)

- More than three hundred personnel from CPCB, State Pollution Control Boards/ Committees were benefitted from the training programmes organized by ETU.
- Twenty five CPCB officials were also nominated for various miscellaneous training programmes organized by other organizations.
- ETU also facilitated participation of thirteen CPCB officials in various international training programmes/workshop/seminars etc. during year 2012-13 sponsored by other organizations.

Chapter IX

ENVIRONMENTAL AWARENESS AND PUBLIC PARTICIPATION

9.1 MASS AWARENESS ACTIVITIES BY CENTRAL POLLUTION CONTROL BOARD ZONAL OFFICES

9.1.1 World Environment day Celebration at Bhopal

World Environment day is celebrated every year on 5th June all over the world to stimulate awareness as well as to enhance public attention and action on the issues related to environment. On this occasion a series of awareness programmes were organised during 22 May, 2012 to 5 June, 2012, which include distribution of pamphlets, video on dance for environment, tree plantation at Smriti van, Bhopal.

UNEP's theme for 2012 environment day is 'Green economy: does it includes you?' Keeping in mind the mentioned theme central Pollution Control Board Zonal office Bhopal organised programme in association with residential welfare society of AG colony, Bhopal.

A video film, 'dance for environment' was also produced covering and associating the local residents/public at important places of Bhopal i.e. airport, railway station, DB mall, New market, Rangmahal, Tazul Masjid, Bittan market, Police line, Nehru Nagar etc. This video was displayed on various occasions and was appreciated by viewers.

Under the mass awareness activity various awareness programmes were also organised in schools namely Mount Carmel school, Bagmughaliya and Carmel convent senior secondary school, Ratanpur and Saket Nagar residential welfare society areas to educate and make aware the people about plastics and solid waste management, air, water and noise pollution and other current issues related to the environment.

On 17th March, 2013, a workshop was organised on plastic waste management among the people of Baba Nagar slum area in association with local NGO Rastrahit Jagrati Gandiwadi Prayas . In the programme, several lectures were delivered by the experts from Central Pollution Control Board and Madhya Pradesh Pollution Control Board. Two films were screened and a quiz programme was also organised to encourage the children. In these mass awareness programme, active and positive participation of all were observed.

9.1.2 World Environment day Celebration at Lucknow

World Environment Day, 2012 was celebrated at Central Pollution Control Board Zonal Office, Lucknow. The programmes carried out on the day included Plantation, Interaction among staff members in the conference hall to create the awareness and Banner Display.

9.1.3 Mass awareness Programmes at Bangalore

- Three days awareness programme was conducted at Vagdevi School, Whitefield, Bengaluru. Demonstrations were given to students.
- On June 5, 2012 World Environmental Day was celebrated at Central Pollution Control Board Zonal Office, Bangalore. Saplings were distributed to all the staff members.

- Participated in an awareness drive called "PARIVARTANA (Change)" at Hebbal, Bangalore. Posters were distributed to common people to encourage solid waste segregation at Bangalore city.
- Participated in meetings at Doordarshan, Bangalore and provided short videos and presentations in Kannada language to be telecasted during Paryavaran Darshan. Collected archives of all programmes telecasted under 'ParyavaranDarshan' from Doordarshan Kendra, Bangalore and Hyderabad.

9.1.4 Mass awareness Programmes at Central Pollution Control Board Project Office- Agra

World Environment Day, 2012 was celebrated by Central Pollution Control Board, Project Office Agra in Agra city on 5th June 2012, the distribution of pamphlets, stickers at various locations including Tajmahal, Etmad-ud-daulah, Rambagh, Dholpur House and other places were carried out by CPCB officials on World Environment Day, 2012.

Mass awareness programme was organized at Youth Hostel, Agra in association with UPPCB and Association of Professional Graduate Civil Engineer, Agra on "World Environment Day". About 100 participants were present along with prominent speakers working in different fields in Agra.

9.2 IMPLEMENTATION OF RAJBHASHA HINDI

During the year the following programme/Target were organized/ achieved:

- 4 Hindi Workshops/Meetings were organized at Central Pollution Control Board Project Office - Agra
- Hindi Pakhawara was celebrated at Project Office during 14-30 September, 2013.
- 9 Books in Rajbhasa Hindi were purchased on different topics.
- Central Pollution Control Board Project Office-Agra achieved "Third" position among 120 Central Govt. organisations/Banks/PSU by NARAKAS, Agra for the Rajbhasa Hindi works during year 2012-13 and awarded with certificate and shield.

9.2.1 Celebration of Hindi Pakhwada at Bhopal:

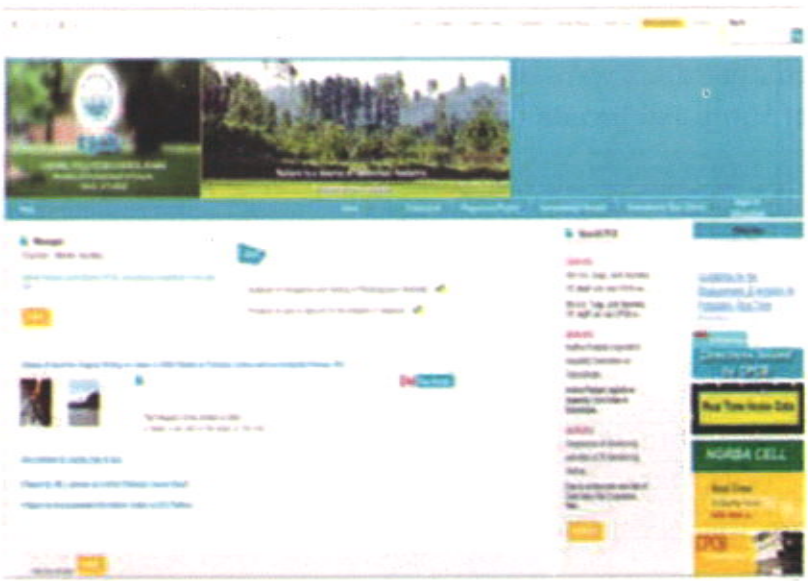
Central Pollution Control Board, Zonal Office Bhopal in compliance of the Rajbhasha Rules, undertaking most of the correspondence and file work in Hindi only. Sincere efforts are made for continuous implementation of Rajbhasha in the office. As per the Rajbhasha rules, quarterly meeting and workshop were organised at Bhopal in association with local office of Department of Official Language. Several events and competitions were organised during 31 August to 14 September 2012 in celebration of Hindi Pakhwada. Details of the programme are as below:

Date	Activity
Activity	Oath for Rajbhasha development and compliances.
31.08.2012	Oath for Rajbhasha development and compliances.
03.09.2012	Shrutilekh competition.
04.09.2012	Rajbhasha Seminar and workshop
05.09.2012	Essay competition.
07.09.2012	Rajbhasha rules competition.
10.09.2012	Unicode Hindi typing competition.
11.09.2012	Extempore and speech on given Environment issue.
14.09.2012	Inauguration of E-Patrika, Cultural programme and prize distribution.

9.3 STRENGTHENING OF NETWORK AND UPDATION OF CPCB WEBSITE:

An uninterrupted LAN and Internet connectivity with enhanced bandwidth of 34 Mbps leased line on new blade server system was established at Parivesh Bhawan. In addition a Wi-Fi network for the common areas and the halls was developed to cater more than 350 users. The networks and the desktop systems has been secured through a centralized anti-virus protection to eliminate the vulnerabilities in the network. The networks at Zonal Offices, Vadodara, Lucknow and Kolkata are being strengthened to make these offices, Wi-Fi enabled and ready for integration with MPLS network of CPCB.

CPCB's website has been updated with rich content on technical activities of the Board. During the calendar year 2012, number of hits was more than 2.75 crore, out of which 94% hits were successful. During the reporting period 8,05,588 visits were made to the site and average duration of visit was more than 6 minutes. One third of the visits were made by the international users.



CPCB Main Website has been migrated to National Data Centre under Linux with dedicated Virtual Machine under Cloud Computing Environment, a new and latest technology in hosting at NIC. The information on standards, inspections, directions, analysis reports and many other technical reports are uploaded for easy access to the public.

9.4 NGO CELL IN CPCB

An NGO Cell was set up at Central Pollution Control Board in the year 1992 to coordinate the following tasks:

- Enlist environmental NGOs involved in activities related to pollution control with CPCB;
- Establish NGO network in consultation with State Pollution Control Boards/ Zonal Offices;
- Provide training to the NGOs and equip them with facilities, like water testing kits, analytical instruments, books, literature etc. in order to enhance their capabilities in the field of pollution control; and
- Organise mass awareness programmes and pollution control activities through NGOs.

During year 2012-2013, 4 NGOs were additionally enlisted with CPCB subject to concurrence of concerned CPCB Zonal Offices apart from 752 NGOs already enlisted during previous years. A rebate @ 50% is extended for the purchase of CPCB publications, to NGOs enlisted with CPCB and several NGOs have availed this facility during the year 2012-2013.

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 one Appellate Authority for dealing the requests received from information seekers RTI 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.

Table 9.1 Status of the applications received under RTI during 2012-13 are as follows:

Quarter	Applications	Appeals	Transferred
Apr - June	72	8	12
July-Sept	78	5	13
Oct-Dec	98	7	20
Jan-Mar	90	10	18
TOTAL	338	30	63

9.6 PUBLIC COMPLAINTS & VIP REFERENCES RECEIVED & DISPOSED DURING THE YEAR 2012 –13 at CPCB-HQ

A total of 587 Public Complaints were received and disposed off during the Year 2012 – 2013 as well as 21 VIP references were received and disposed.

9.7 CENTRAL POLLUTION CONTROL BOARD PUBLICATIONS DURING THE YEAR 2012-13

15 Publications published during the year 2012-13 as detailed below:

S. No.	Title of the report
01	Status of Water Quality in India-2010 : MINARS/34/2010-11
02	Environmentally Sound Management of Mercury Waste Generated in Health Care Facilities: HAZWAMS/39/2011-12
03	National Ambient Air Quality Status & Trends in India – 2010 : NAAQMS/35/2011-12
04	Epidemiological Study on Effect of Air Pollution on Human Health (Adults) in Delhi : EHMS/01/2012
05	Study on Ambient Air Quality, Respiratory Symptoms and Lung Function of Children in Delhi : EHMS/02/2012
06	Annual Report 2010-11 (English)
07	Annual Report 2010-11 (Hindi)
08	Guidelines for (i) Siting of rice shellers/mills; (ii) handling and storage of rice husk and (iii) handling, storage and disposal of ash generated in boiler using rice husk as fuel : COINDS/82/2012-13
09	Profile of CPCB (English)
10	Profile of CPCB (Hindi)
11	Brochure on Save River Ganga (English)
12	Brochure on Save River Ganga (Hindi
13	Parivesh Newsletter "De-colourisation of Industrial Effluent an Environmental Dillemma 'Colour' is a Pollutant"
14	Electronic Kachre ka prabandhan
15	Pradushan aur badalti aavohava (Prithvi par mandratha sankat)

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 2012-2013 Central Pollution Control Board organized 3 Hindi workshops for sensitizing the officials of CPCB with the Official Language. Ninety five officers and staff participated in the workshops.

Hindi Diwas was celebrated on 14th September, 2013 in CPCB-HQ under the chairmanship of Shri J.S. Kamyotra, Member Secretary, CPCB. The employees of

CPCB actively participated in the competitions organized during this occasion. Cash prizes were awarded to the winners. Renowned poet Shri Sunil Jogi and poetess Ms. Suman Duvey graced the occasion two Hindi Books entitled "प्रदूषण और बदलती आबोहवा: पृथ्वी पर मंडराता संकट"- श्री नवनीत कुमार गुप्ता और इलेक्ट्रोनिक कचरे (ई-वेस्ट) का प्रबंधन - श्री देव प्रकाश" were released on this occasion by the Member Secretary and special guest Shri Sunil jogi. These books were awarded 1st and 2nd prize under the " Incentive Scheme for original book writing in Hindi on environmental pollution"

Welcome address by Hindi Officer Member Secretary & Chief Guest

Officer Member Secretary & Chief Guest releasing Hindi Books on Hindi

As per the directives of Deptt. of Official Language, Ministry of Home Affairs Zonal Office-Kolkatta, Shilong and Bhopal were inspected during the year 2012-13 to assess the status of compliance of Official Language Policy and the compliance were found satisfactory.

In the Symposium and Workshop of Centre for Training & Development organized in Kovalam, Thiruvananthapuram, Kerala, Central Pollution Control board was awarded with Citation Letter for its remarkable work regarding propagation of contribution in promoting the progressive use of Official Language- Hindi. At this event of significance, Hindi Officer represented Central Pollution Control Board HQs.

सेंटाड
प्रशिक्षण एवं विकास केंद्र

CENTAD
CENTRE FOR TRAINING & DEVELOPMENT
165(32), 3rd Cross, Hanumanthanagar, Bangalore-560 019.
Phone : 080-22426720, 65313954 Fax : 080-26603954
Email : benaka123@rediffmail.com

प्रशस्ति - पत्र

यह प्रमाणित किया जाता है कि, केन्द्रीय प्रदूषण नियंत्रण बोर्ड ने राजभाषा हिन्दी के प्रगामी प्रयोग एवं कार्यान्वयन की दिशा में उल्लेखनीय योगदान दिया है। उन्होंने व्यक्तिगत रुचि लेकर हिन्दी प्रचार-प्रसार के लिए प्रशंसनीय भूमिका निभाई है।

इन महत्वपूर्ण उपलब्धियों के लिए उन्हें विशेष रूप से प्रशंसित और सम्मानित किया जाता है।

स्थान: अखिल भारतीय राजभाषा सम्मेलन,
कोवलम, तिरुवनंतपुरम, केरल
तिथि: 21-08-2012 से 22-08-2012

APPRECIATION - LETTER

This is certified that Central Pollution Control Board, Delhi has done remarkable work regarding propogation of progressive use of Official Language - Hindi and its implementation by generating wide interest. For this outstanding achievement, it is being conferred with Special Honour and appreciation.

Place : All India Official Language Conference,
Kovalam, Thiruvananthapuram, Kerala.
Dated : 21-08-2012 to 22-08-2012

(कार्यक्रम निदेशक)
Programme Director

As per the directives of Ministry of Home Affairs CPCB carried 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 2011-12. Committee constituted for the purpose of evaluation recommended 1st, 2nd and 3rd prizes to Shri Prashant Kumar Mishra, Associate Professor, Vinova Bhave University, Jharkhand, Mr. Dev Prakash, SSA,Central Pollution Control Board, Delhi, Dr. Rradheshyam Maurya, प्रवक्ता ग्रा.वि. इंटर कॉलेज Inter College Delhupur, Pratapgarh (UP) and Mr Lalman Gupta , Laboratory Assistant, College of Sciences and Humanities, Bllab Govind Pant University of Agriculture and Technology, Pantnagar, respectively.

CHAPTER X

ENVIRONMENTAL STANDARDS INCLUDING SCHEDULE FOR THEIR ENFORCEMENT

10.1 DEVELOPMENT OF STANDARDS AND GUIDELINES

Activities undertaken by Central Pollution Control Board during the year 2012-13, regarding Environmental Standards/Guidelines enforcement are summarized below:

10.1.1 Guidelines for the measurement of "notified ambient air quality parameters" (NAAQPs-2009)

CPCB has notified fourth version of National Ambient Air Quality Standards (NAAQS) in 2009 under the provisions of the Air (Prevention & Control of Pollution) Act, 1981. This revised national standard aims to provide uniform air quality for all, irrespective of land use pattern, across the country. There are 12 identified health based parameters in the notification, which are to be measured at the national level. The methods, prescribed in the notification for respective parameters are the combination of wet-chemical method and continuous on-line methods. For the sake of uniformity in method and to meet the NAAQS, 2009 requirement across the country, the guidelines were prepared in two volumes based on active methods and automated (on-line) methods.

10.1.2 Guidelines on Methodologies for Source Emission Monitoring

Guidelines on Methodologies for Source Emission Monitoring have been collated and compiled in the form of a document entitled "Guidelines on Methodologies for Source Emission Monitoring" under the CPCB publication series Laboratory Analytical Techniques (LATS). These guidelines will help in harmonizing the sampling and analytical protocol being used by SPCBs and CPCB during source emission monitoring.

10.1.3 Development of standards and guidelines for water conservation and wastewater discharge in sugar mills

Sugar cane consists of about 700 litre/ ton of cane water, out of which 100 – 200 litre/ton of cane crushed is excess condensate. Theoretically, quantity of fresh water consumption in sugar mills can be brought down to "ZERO", if the excess condensate is utilized and the effluent generation rate can be reduced to 0.10 m3 per ton of cane. The possibilities of achieving zero fresh water consumption in sugar mills being explored in the project.

The standards for water consumption and wastewater generation in different categories of sugar industries are developed based on detailed study carried out at 11 sugar mills.

The sugar mills were classified into 3 categories as follows, based on cane crushing capacity and types of boiler:

Case-I: Sugar mill with low pressure boiler (Pressure upto 45 kg/cm2)

1. Small scale (upto 2500 TCD)
2. Medium scale (2500 to 5000 TCD)

Case-II: Sugar mill with high pressure boiler (Pressure more than 45 kg/cm2)

1. Small scale (upto 2500 TCD)
2. Medium scale (2500 to 5000 TCD)
3. Large scale (more than 5000 TCD)

Case-III: Sugar mill with high pressure boiler and refinery

1. Small scale (upto 2500 TCD)
2. Medium scale (2500 to 5000 TCD)
3. Large scale (more than 5000 TCD)

11 sugar mills present in Uttar Pradesh, Haryana, Bihar, Maharastra, Karnataka, Gujarat and Tamil Nadu were studied in detail. Production process in each plant was studied in detail. Fresh water consumption and wastewater generation from different unit operations were identified and quantified based on field methods. Wastewater from effluent sources was characterized. Water balancing was carried out for considering freshwater intake, cane water and condenser cooling water. Possibilities of reusing water in the unit process have been explored.

The outcome of the project shows that, it is techno-economically viable to implement Zero Fresh Water Consumption in sugar mills. Sugar mills will be economically benefited through implementation of zero fresh water consumption as it minimizes the amount paid towards the Water Cess. Approximately, 5 X 107 m3 of fresh water could be saved per year nationally on implementation of the proposed standards. Guidelines for implementing process modification, 3R principles and good housekeeping in milling section, power turbine cooling, boiler house, clarification house, evaporation section, crystallisation and centrifugation section, spray pond/ cooling tower and Effluent Treatment Plant in implementing zero fresh water consumption and achieving Zero Fresh Water consumption and standards for wastewater discharge being developed.

The major findings of the study are as follow:

1. Rate of water consumption and wastewater generation reduces as the cane crushing capacity increases.

Table-10.1 Fresh Water consumption and waste water generation, as per crushing capacities (Litre/tonne of cane)

S. No.	Scale of sugar mill	Fresh water consumption		Wastewater generation	
		Range	Average	Range	Average
1.	Small scale	-	171	-	301
2.	Medium scale	148 - 313	160	160 - 549	263
3.	Large scale	27 - 367	144	170 - 247	213
	Average	27 - 367	158	160 - 549	259

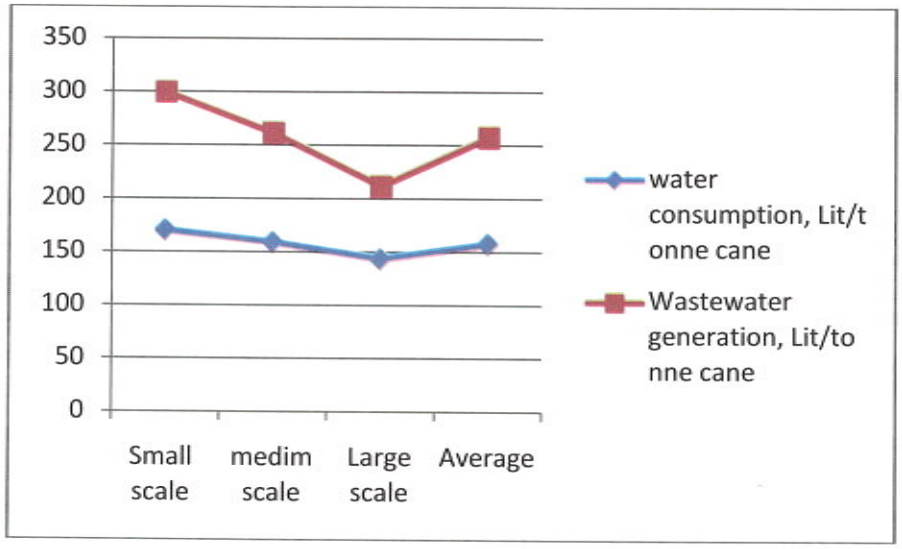


Fig- 10.1 Water consumption and waste water generation:

2. Rate of water consumption and wastewater generation has been found irrespective of age of the mill and distillery unit attached to it. Instead, water consumption and wastewater generation depends on cogeneration plant and refineries attached to the sugar mills and boiler pressure.

3. Characteristic of sugar mill wastewater is presented in Table 10.2.

Table-10.2 Wastewater Characteristic

S. No.	Parameters	Sugar mill wastewater	Spray pond/cooling tower overflow
1.	pH	5.5-8.0	7.0-7.5
2	TDS, mg/l	500-2000	2500-3000
3	Total Hardness	10-100	600-100
4	COD, mg/l	1000-3000	850-1000
5	BOD, mg/l	500-1500	300-450

4. The water balance for sugar mills with low pressure boiler are presented in figure 10.2 to 10.5

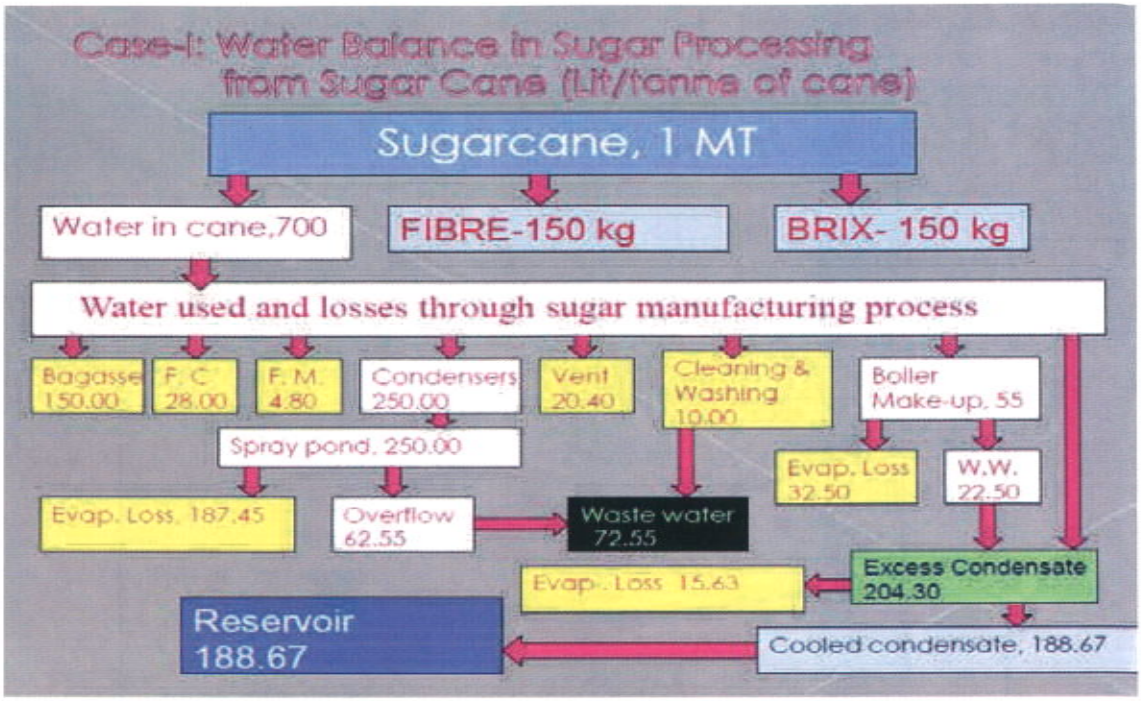


Figure-10.3: Case-I, Fresh water balance in Sugar mills and generation of waste water

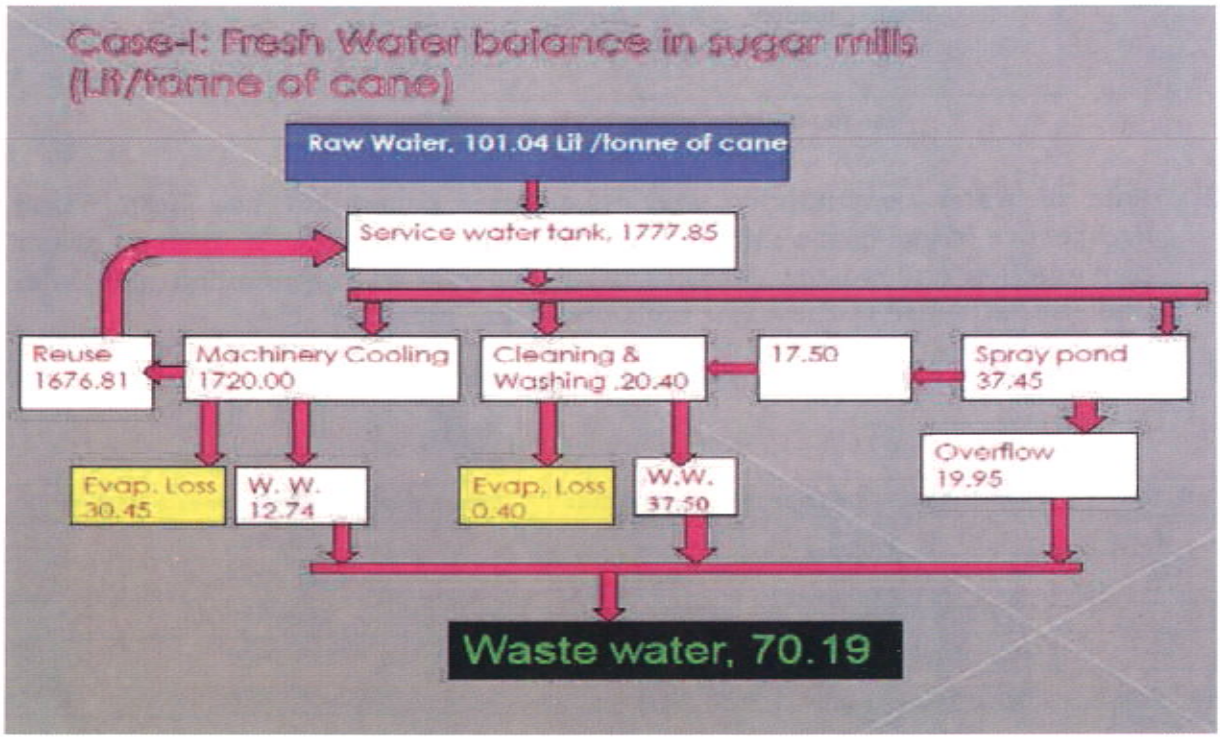


Figure-10.4, Case-I, Condenser cooling water balance

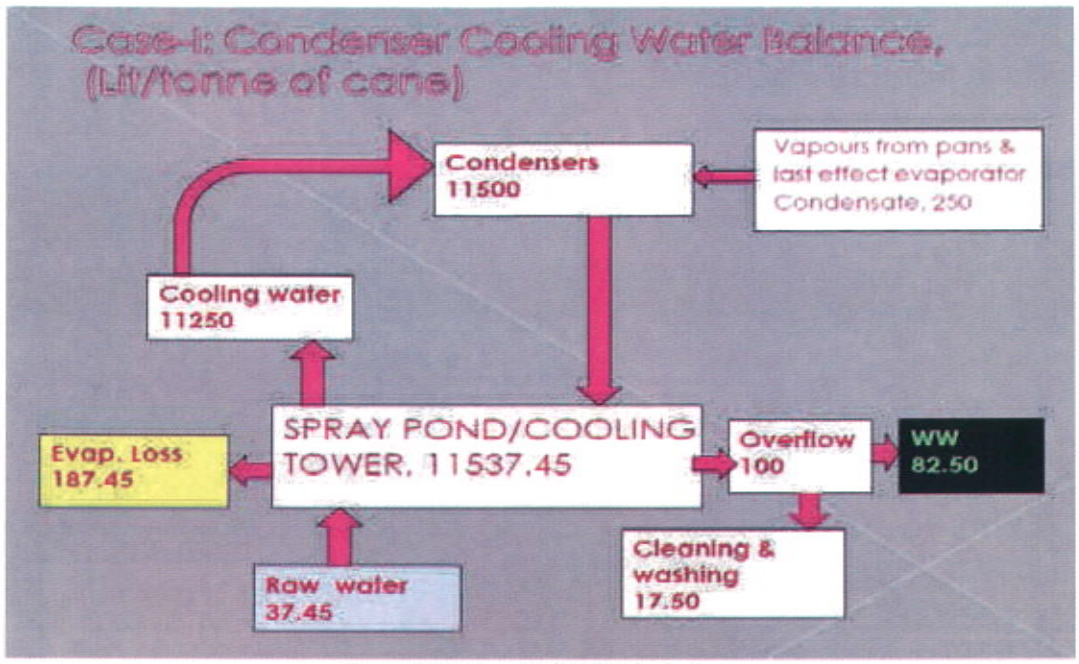


Figure -10.5: Case-I, Total Water balance

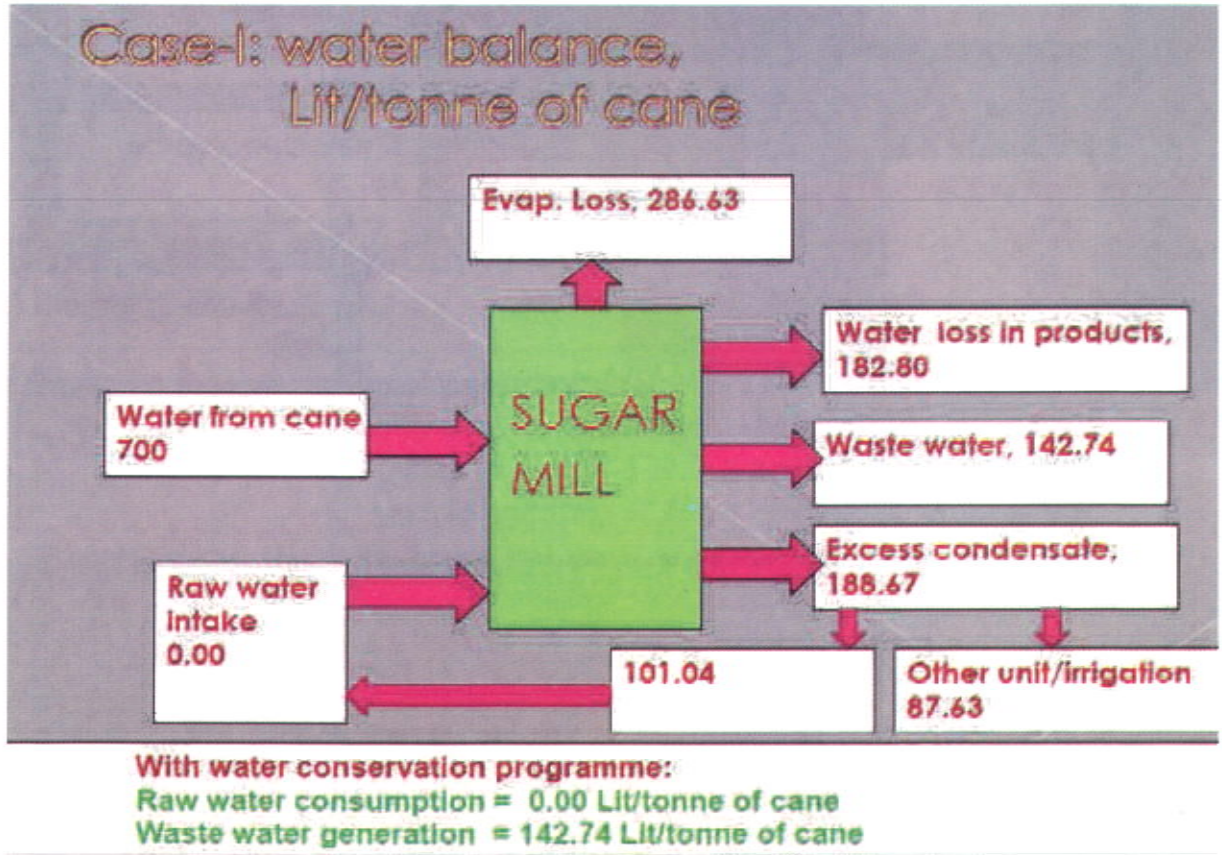


Figure 10.6 : Case-II, Total water balance in case of Sugar mill with high pressure boiler

5. Similar studies has also been carried out in Sugar mill with high pressure boiler and Sugar mill with high pressure boiler attached to refinery and details presented in figure 10.6 & 10.7.

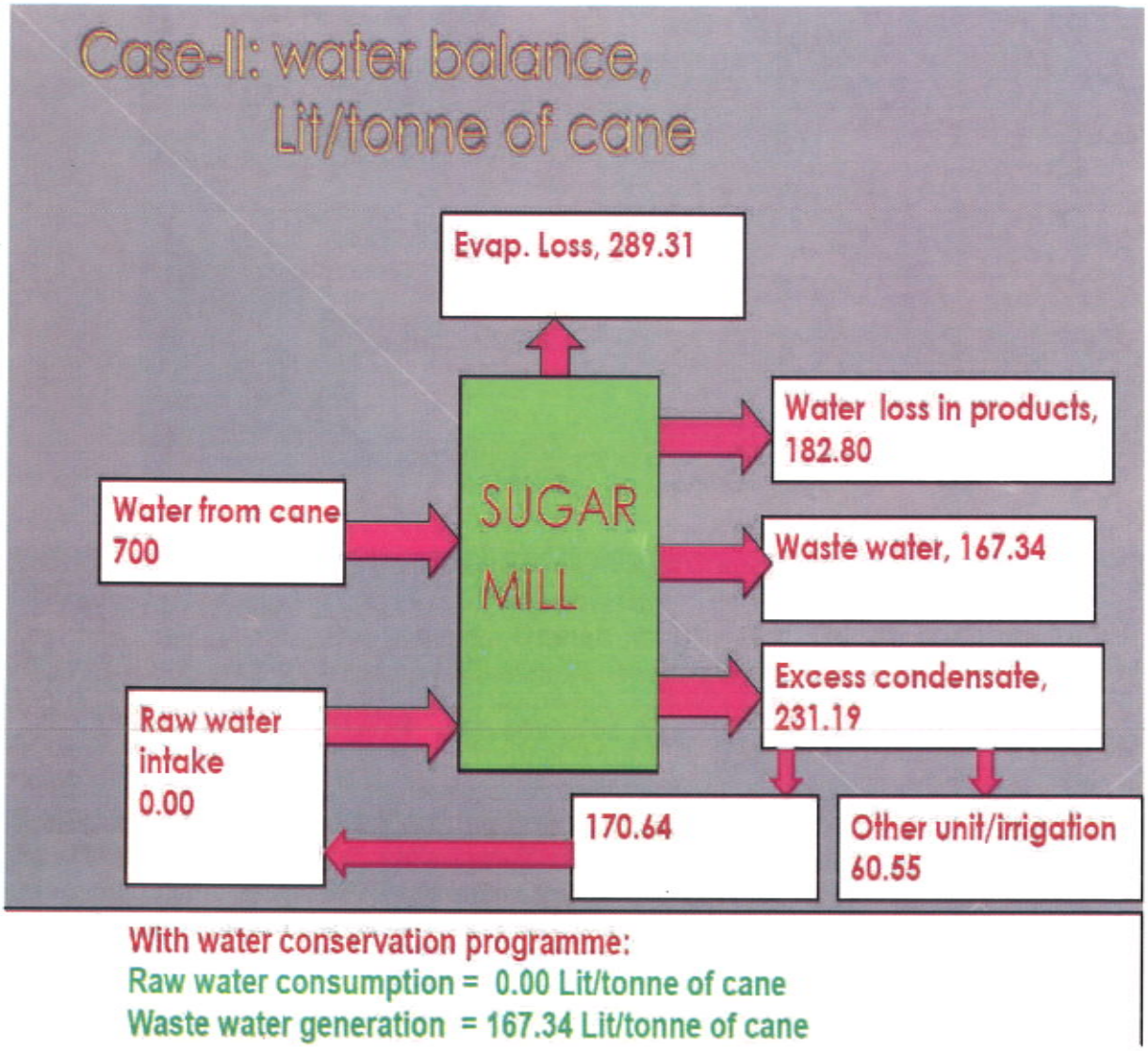
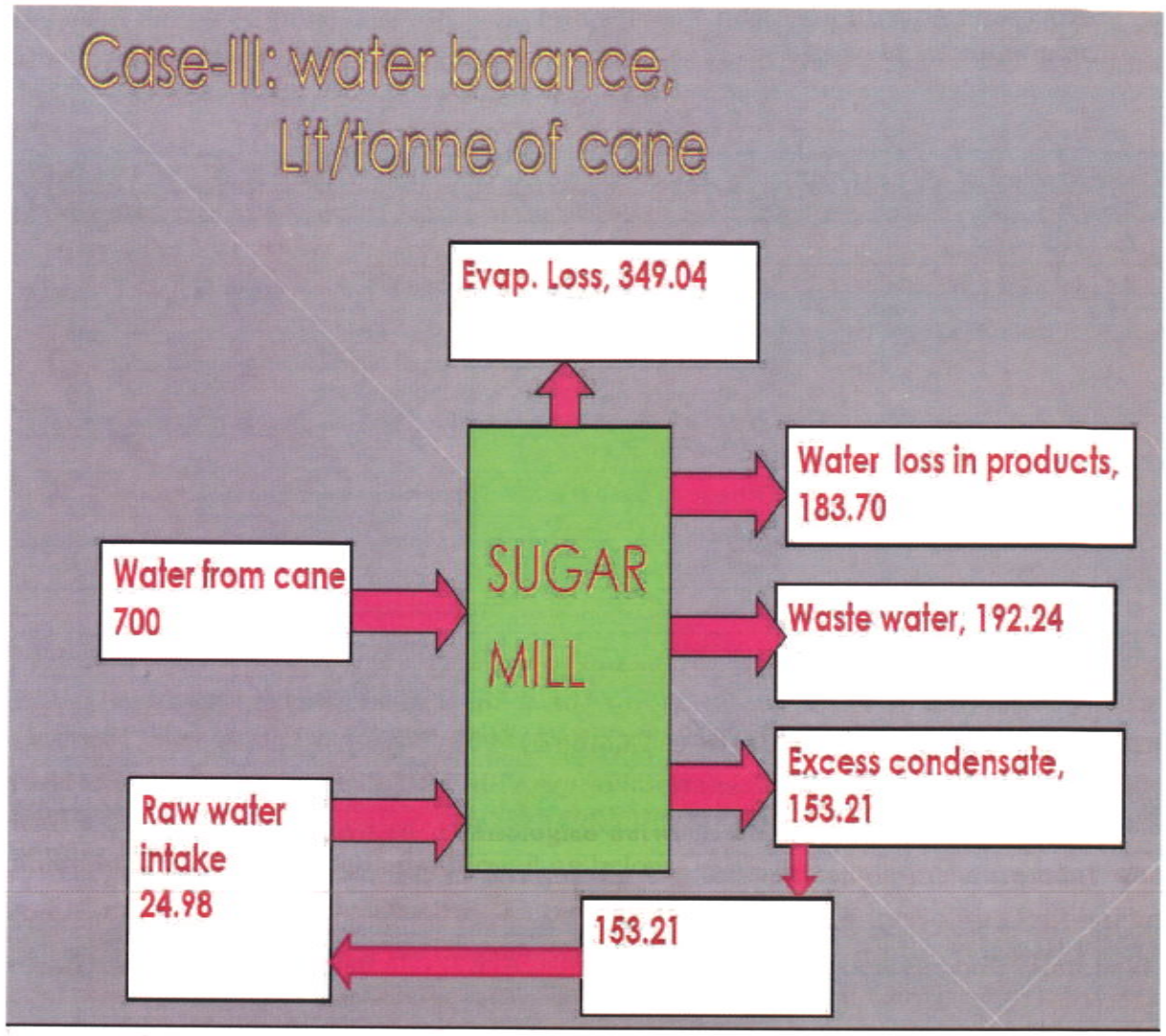


Figure 10.7: Case-III, Total water balance in case of Sugar mill with high pressure boiler and refinery



With water conservation programme:

Raw water consumption = 24.98 Lit/tonne of cane

Waste water generation = 192.24 Lit/tonne of cane

Fig.10.7: Case-III, Total water balance in case of Sugar mill with high pressure boiler and refinery

6. Process modifications, 3R principles and good housekeeping to which needs to be adopted achieving Zero Fresh water consumption are as follow:

Table 10.3 : Section-wise options for Water Conservation and Waste Water Reduction at Sugar Mills

Sl. No.	Section/particulars	Options for water conservation and waste water reduction
1.	**Milling**	
i.	Fibrizer cooling water	Re-use of cooling water through service water tank.
ii.	Mills bearings cooling	▪ Re-use of internal cooling water through service water tank ▪ External cooling water to be recycled after separation of suspended particles, oils and grease. ▪ Installation of centralized lubrication system with use of grease instead off oil.
iii.	Mills turbines cooling	Re-use of cooling water through service water tank.
iv.	Mills floor washings	Dry cleaning with bagasse as far as possible and use of hot water washing once a day.
2.	**Power turbines cooling**	Re-use of cooling water through service water tank.
3.	**Boiler house**	
i.	Make-up water	▪ Low pressure boiler-Use of Ist body vapour condensate. ▪ High pressure boiler-Use of vapour condensate treated water through DM/RO Plant. Or Vapour condensate after treatment of CPU.
ii.	Feed water pumps	▪ Reuse of cooling water through Separate collection tank.
iii.	Blow down	▪ Use of blow-down water for wet scrubber or mix with excess condensate.
iv.	DM Plant	▪ Use of back wash water for wet scrubber.
v.	APC Equipment	▪ Installation of Electrostatic precipitators instead off wet scrubber.
4.	**Clarification house**	
i.	Over flow & leakages	▪ Avoid overflows from condensate tanks and leakages from pipes and valves.
ii.	Pumps -	▪ Installation of mechanical seal – no cooling water OR ▪ Reuse through Separate collection.
iii.	Sulphur Burners, Air compressors & vacuum pumps cooling	▪ Installation of cooling tower and reuse after cooling.
iv.	Vacuum filter condenser	▪ Re-circulation of cooling water through spray pond/cooling tower.
v.	Juice heaters cleaning	▪ Use water from spray pond/cooling tower during brushing. `
5.	**Evaporation section**	
i.	Pumps	▪ Installation of mechanical seal – no cooling water OR ▪ Reuse of cooling water through Separate collection tank.

Sl. No.	Section/particulars	Options for water conservation and waste water reduction
ii.	Last effect condenser load	▪ Reduction of vapour load on last effect condenser by effective vapour bleeding in evaporators. ▪ Installation of vapourline juice heater.
iii.	Evaporators cleaning	▪ Use of water from spray pond/cooling tower during brushing. ▪ Use of soda boiling water for ETP to maintain pH.
6.	**Crystallisation and Centrifugation section**	
i.	Pans	▪ Use of minimum amount of water in pans. ▪ Reduction of massecuite % cane by efficient molasses exhaustion to reduce vapor load on condensers. ▪ Installation of single entry condenser. ▪ Installation of external catchall to reduce entrainment. ▪ Installation of surface condensers.
ii.	Centrifugal	▪ Use syrup for magma mixing and sugar meting instead of water. ▪ Construction of common collection pit and reprocess of sugar content materials.
iii.	Crystallisers	▪ Reuse of massecuite after cooling water
7.	**Tap connections**	▪ Minimum no. of taps and Install spring-loaded cock to each water tap connection.
8.	**Spray pond /cooling tower**	▪ Use of spray pond /cooling tower water for washing and cleaning to reduce overflow. ▪ Addition of water to maintain the quality of water as per the irrigation. ▪ Use of overflow for irrigation of land.
9.	**Laboratory use**	▪ Collection of all sugar content material samples in a separate drum, after analysis it is to be send to process.
10.	**ETP**	▪ Installation of Biological treatment followed by disinfection and filtration system. ▪ Use of treated water for land irrigation or for attached industrial units.

10.1.4 Revision of Environmental standards for Electroplating Industry

The study for development of Environmental Standards for Electroplating Industry has been undertaken by Central Pollution Control Board (CPCB). Based on the study, the environmental standards for Electroplating Industry were finalized and notified under the Environment (Protection) Rules, 1986 in March, 2012

10.1.5 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. The effluent standards suggested by CLRI were further reviewed in CPCB and the draft revised standards were circulated to stakeholders for consultation. The comments received were considered and the modified proposal of 'Revised Effluent Standards for Leather Tanneries' was prepared.

The proposal was scheduled to be discussed in the Peer & Core Committee but was deferred on the request of Council of Leather Expert.

10.1.6 Revision of Effluent Standards for Common Effluent Treatment Plants

Central Pollution Control Board (CPCB) had undertaken the revision of the existing Effluent Standards for Common Effluent Treatment Plants (CETPs). The draft revised standards for CETPs, were circulated to stakeholders for consultation. The comments received were considered and the modified proposal of 'Revised Effluent Standards for Common Effluent Treatment Plants (for general and tanneries' CETPs) was prepared. The proposal was scheduled to be discussed in the Peer & Core Committee.

10.1.7 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 awarded in May 2010. In-depth studies of 50 brick kilns were completed and a report covering results of the monitoring studies as well as inventorisation data was submitted by the executing institute during year 2012-13. The final report including suggested standards is under finalization.

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 awarded in January 2010. In-depth studies have been completed and the findings/ recommendations of the study and a suggested improved clamp kiln design were presented in consultation workshop held in March 2012 to finalize the improved clamp kiln design. After considering the views of experts and stakeholders, the improved clamp kiln design was finalised during year 2012-13

10.1.8 COMPREHENSIVE INDUSTRIAL DOCUMENT FOR MALTERY.

The study was undertaken to review the existing Minimum National Standards and to upgrade the existing COINDS document to include new and developing technologies adopted in maltery, so that maltery could achieve stringent emission and effluent norms with maximum recovery at minimum cost.

Inventory of the malteries in the country was carried out and preliminary data was collected through questionnaire survey. Three units were studied in detail in terms of processes, technologies, their efficiency, intensity of resource consumption, overall

material and energy balances, generation of pollutants, measures implemented for prevention, control and treatment of pollutants. Based on the study, standards for wastewater disposal and emissions were evolved in terms of concentration and quantities of pollutants.

Based on the study, new standards for quantity of fresh water consumption in maltery are proposed as 4.0 m^3/ton of malt and wastewater generation as 3.0 m^3/ ton of malt. The standard for quantity of wastewater generation is proposed to be valid till three years. In three years all the malteries are suggested to implement Zero Liquid Discharge. In addition effluent disposal standards in terms of pollutants quantities are proposed and guidelines for achieving the proposed standards are being developed. Emission standards for barley screening and malt screening are proposed as 50 mg/Nm^3.

New set of Minimum National Standards for Maltery for water consumption, wastewater generation, effluent standards and emission standards are proposed to be placed before peer and Core committee and new standards will be notified on approval. On implementation of the proposed standards in maltery, existing fresh water consumption of 10 m^3/ton of malt will reduce to 4 m^3/ton of malt, which in turn reduces the quantity of wastewater generation and stress on fresh water reducing overall environmental footprint of the malteries.

10.1.9 Development / Revision of Emission Standards for Cement Sector

Cement industry is one of the major air polluting industry falls under 17 categories of industries in the country. During various operations of cement manufacturing, substantial quantity of dust is generated and emit to the environment, if air pollution control device is not operating efficiently. Cement manufacturing also emits SO_2 and NO_x emissions. The emission standards for particulate matter were notified in April, 1987 and thereafter amended in February, 2006. However, there is no emission standard for SO_2 and NO_x emission. The Parliamentary Standing Committee has also made similar observation and requested CPCB to develop the emission standard for SO_2 and NO_x at an earliest. Considering the above, a study on "Development / revision of emission standards for cement plants" was undertaken in association with National Council for Cement and Building Materials, Ballabhgarh, Haryana. On the basis of the NO_x, SO_2, PM emission level and load based PM emission data vis-à-vis available control technology and prevailing emission standards in other countries, emission standards were finalised and proposed as detailed in Table 10.4. The Peer & Core Expert Committee of CPCB agreed upon the proposal and these were approved in the Board meeting.

Table 10.4 Emission Standards for Rotary Kiln based Cement Industries

NO_x	New Plants (commissioned on or after date of notification)	600 mg/Nm_3 (at 10% O_2)
	Existing plants (commissioned before the date of notification) (these standards are to be implemented from the date of notification until 31.7.2015)	1000 mg/Nm_3** (at 10% O_2)
	Existing plants (commissioned before the date of notification) (these standards will be implemented w.e.f. 1.8.2015)	800 mg/Nm_3 (at 10% O_2)
SO_2	For cement plants having sulphur content in raw meal less than or equal to 0.5 %	100 mg/Nm_3 (at 10% O_2)
	For cement plants having sulphur content in raw meal more than 0.5 %	1000 mg/Nm_3 (at 10% O_2)
Load based Particulate Matter for raw mill, kiln & precalciner system together	Plants commissioned on or after 3.2.2006 (corresponding to 50 mg/Nm_3)	0.125 Kg/tonne of clinker
	Plants commissioned before 3.2.2006 (corresponding to 100 mg/Nm_3)	0.25 Kg/tonne of clinker***
	Plants commissioned before 3.2.2006 (corresponding to 150 mg/Nm_3)	0.375 Kg/tonne of clinker***
Concentration based Particulate Matter	***Existing Standards:***	
	Plants commissioned on or after 3.2.2006	50 mg/Nm_3
	Plants located in urban area or critically polluted area & commissioned before 3.2.2006	100 mg/Nm_3 *
	Plants located in other area & commissioned before 3.2.2006	150 mg/Nm_3 *
	Proposed Standards:	
	Plants commissioned before 3.2.2006 (these standards will be implemented w.e.f. 1.8.2014)	50 mg/Nm_3

*(*w.e.f. 01.08.2014, applicable emission standards will be 50 mg/Nm_3*
*** w.e.f. 01.08.2015, applicable emission standards will be 800 mg/Nm_3.*
****w.e.f. 01.08.2014, applicable emission standards will be 0.125 Kg/tonne of clinker*

NOTE: *In case of Grinding/Blending units, only concentration based PM standards will be applicable)*

Table 10.5 Emission Standards for VSK based cement Industries

Particulate Matter (PM)	Existing Standards:
	400 mg/Nm^3
	Proposed Standards (w.e.f 1.8.2013)
	150 mg/Nm^3
NO_x	500 mg/Nm^3 (at 10% O^2)
SO_2	200 mg/Nm^3 (at 10% O^2)

10.1.10 Description of Clean Technology and Development of Environmental Standards for Limestone Mining

A study has been undertaken on "Description of clean technology and development of environmental standards for limestone mining" in association with Central Institute of Mining & Fuel Research (CIMFR), Dhanbad. The main objective of this study,

apart from giving an overall view of limestone mining operating in the country, is to develop the National Environmental Standards, to provide cleaner technologies and to specify Guidelines / Code of Practice for Pollution Prevention & Control. The study has been completed and Final report has been discussed with stakeholders in the meeting held on November 16, 2012 at CPCB, Delhi. CIMFR presented the findings of the study that envisaged development of industry specific environmental standards, activity wise emission data, mine and workshop wastewater quality and noise level for all the ten lime stone mines selected across different regions of the country. Further , clean technologies such as surface miner, Wet drilling, ripper dozer, hydraulic hammer/rock breaker, deck charging, split charge, blasting, non-electric initiation device, electronic detonator, use of optimized truck dispatch system are envisaged in the study

The findings and proposed standards were discussed in Peer & Core Committee. Standards proposed for effluent and noise levels as in Table 10.6 and 10.7, were agreed by the stake holders. The Members felt that further monitoring needs to be conducted at five more mines by CIMFR during the year 2013 to develop the environmental standards for air quality.

Table 10.6 Proposed Waste Water Discharge Standards for Limestone Mines

Parameters	Standards
pH	6.0 to 9.0
TSS (mg/l)	10
Oil & Grease (mg/l)	10

Table 10.7 Proposed Noise Standards for Limestone Mines

Parameter	Noise Limits	
	Day time (6.00 AM to 10.00 PM)	Night time (10.00 PM to 6.00AM)
Noise Level – Leq	75 dB(A)	70 dB(A)

Note: Noise levels shall be monitored both during day & night times on the same day while in operation

10.1.11 Development of guidelines for control of fugitive emissions" and "Development of guidelines for management of solid waste and hazardous waste generated from Integrated Iron & Steel sector"

Integrated Iron & Steel sector is a heavy industry with significant air, water and soil pollution. During year 2012-13, two projects namely, "Development of guidelines for control of fugitive emissions" and "Development of guidelines for management of solid waste and hazardous waste generated from Integrated Iron & Steel sector" were finalized. As outcome of these studies, best practices to mitigate pollution were identified. Subsequently, a set of guidelines on environmental friendly practices and operating conditions for steel plants to minimize environmental impacts has been prepared and proposed to be discussed by National Task Force before its implementation.

10.1.12 Development of Noise and Emission standards for LPG and CNG driven Gensets

Central Pollution Control Board has accepted the proposed emission and noise limits for LPG and Natural Gas driven gensets in its 163rd Board meeting held on 22nd March, 2013. The proposed limits are at par with proposed emission norms for DGset and Genset driven by Petrol and Kerosene.

10.1.13 Compliance status of emission and effluent standards in thermal power plant during the year 2012-13

Central Pollution Control Board compiled the compliance status of emission and effluent standards by the power plants during the year 2012-13. It has been observed that out of 114 thermal power plants, 76 and 88 plants were complying with the emission and effluent standards respectively as reported by CPCB Zonal Offices, SPCBs and individual industries.

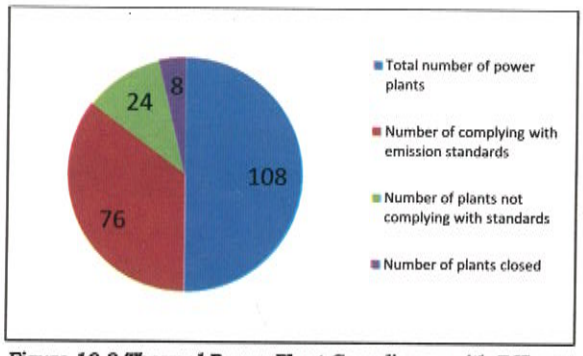


Figure 10.8 Thermal Power Plant Compliance with Effluent Standards

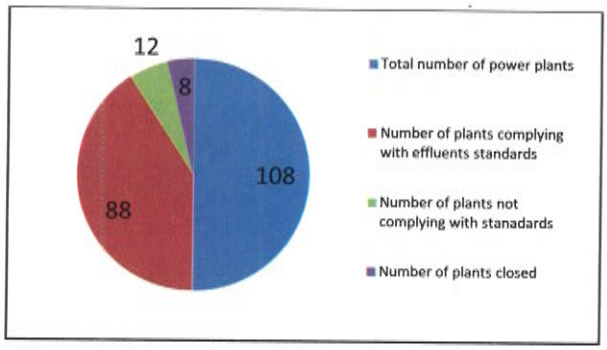


Figure 10.9 Thermal Power Plant Compliance with Emission Standards

10.1.13.1 Use of beneficiated/ blended coal in Thermal Power Plant

Total 50 thermal power plants have been identified to use beneficiated coal. However, 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 coal washing.

The present capacity of washing of coal is only about 103 million tons per annum which is envisaged to reach 263 million tonnes in next five years. Still there is a gap of about 88 million tons in demand and supply. About 92 million tones capacity for beneficiation of non coking coal is under installation by M/s. Coal India Ltd.

The demand of beneficiated coal will further increase as Ministry of Environment & Forests is intended to reduce the distance from mines from1000 kms to 500 kms. Draft notification in this direction has been issued by MoEF.

10.1.13.2 Review of study report on Mercury emission & future approach for control from thermal power plants

The study report prepared by Central Institute of Mining and Fuel Research (CIMFR) under the Ministry of Environment & Forests sponsored study was reviewed by Central Pollution Control Board. The data show low mercury levels in Indian coal (0.14 g/ton) compared to China (0.17 g/ton), USA(0.21 g/ton), South Africa (0.31 g/ton), and Australia(0.215 g/ton). Mercury emissions from coal fired thermal power plants in India with present pollution control technology (ESP) is estimated to about 46 tons for the year 2011 which will be increased to 106 and 148 tons by the year 2016 & 2021 respectively, considering the present control technology. However, in future, probably in the beginning of 13th Plan, new thermal power plants will have to have Electrostatic Precipitator, Flue Gas Desulphurization & Selective Catalytic Reduction, then the mercury emission will be lower than estimated.

Following approach for the existing and new plants for control of mercury emissions are suggested:

- Mandatory use of beneficiated coal by the existing plants, irrespective of the distance from the mine by the end of 12th plan
- All existing thermal power plants shall augment the efficiency of ESPs, so as to meet the emission limit of 50 mg/Nm3 for particulate matter.
- Central Electricity Authority should come out with a plan for reduction in heat rate for improvement in thermal efficiency for all the existing power plants, so that all plants should attain minimum thermal efficiency of 30%.
- For new thermal power plants to be commissioned in 13th Plan (2017-2022), besides cleaner technologies like super critical, IGCC etc. The multi pollutant control strategies (Electrostatic Precipitator + Flue Gas Desulphurization + Selective Catalytic Reduction) shall be adopted, wherever required.

10.1.14 Preparation of Comprehensive Industry Document (COINDS) and the Status of Paint Industry

Paints constitute a mixture of solvents, binders, pigments and additives. The raw materials used in the manufacturing of paint are organic chemicals, solvents, heavy metal based pigments or complex resins, which results in air emissions (VOC & dust), wastewater and solid waste/hazardous sludge (containing heavy metals & toxic organic chemicals). COINDS was prepared in the year1990-1991 for development of effluent standards only. Since then the 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 the existing effluent standards and to develop the emission standards (VOCs).

This study was initiated in collaboration with NPC, New Delhi. In first phase, dry study was carried out in 10 units. Based on this, 6 units covering all type of paints, varying production capacities, location were selected for In-depth study. Final report submitted indicate that main source of waste water is from mixer/ pug mills/ TSD/ cleaning operation & floor washing. solid/ hazardous wastes are generated from ETP, production process and from incinerator. The main source of VOC, is shop floor during filling operation. The emitted VOCs at the shop floor were extracted from one side through exhaust system and fresh air is allowed to flow from other end.

10.1.15 Implementation of new 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 Fourth 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 March 2nd, 2013 at Bhatinda, Punjab.

The following tasks for refineries were recommended for implementation of CREP recommendations and implementation of standards:

- All refineries shall provide connectivity of stack to CPCB and SPCB by May 31, 2013 and in case of any problem or hurdles, this will be informed to SPCB/ CPCB with reasons.
- The refineries shall assess the technical feasibility with cost economics for implementation of bottom loading of all products in trucks & railways for emission reduction so that further action required can be taken.
- All refineries shall report to CPCB of any accident or pipe leakages occurring within 24 hours along with action taken or proposed.
- The refineries shall forward notes on success accomplished by them in environmental activities during the period 2005-2013.
- RIL to forward a note on the proposed modifications of effluent treatment facilities to comply with the notifications along with the time schedule i.e. covering of ETP and providing system for VOC adsorption.
- All refineries shall submit note on the storage arrangement made for oily sludge including details of stored oily sludge, proposal for bio-remediation with time bound programme and status of disposal of bio-remediated soil.
- Refineries to compile data on particulate matter emitted, wherein the dual fuel (fuel gas and fuel oil) is used, to assess the factors effecting achievability of emission norms.
- The comments on proposed guidelines for bio-remediation be forwarded for consideration before finalizing.

- All refineries shall submit action plan to achieve zero-discharge and to cover their ETP with VOC adsorption system.
- Refineries to submit time bound action plan to install state-of-the-art systems like SCADA (for monitoring the health of the pipeline) in all their crude and product pipelines and a time bound programme for replacing the old pipelines.
- M/s Gurugobind Singh Refinery shall provide one more continuous air quality monitoring station to generate back ground data to assess the impact of air quality due to refinery operation.

10.1.16 Effluent and Emission standards for Dyes and Dye Intermediate

The Environmental Standards for Dyes and Dye Intermediate Industries were discussed in the eighth meeting of the Expert Committee on Environmental Standards held on February 08, 2013 in the Ministry of Environment & Forests, New Delhi. The standards got approved by the committee for notification under the Environment (Protection) Act, 1986.

10.1.17 Environmental Standards for Fertiliser Industry

As per recommendations of the Peer and Core Committee, data was collected from the units and compiled data with proposed standards were discussed in Twenty seventh Peer and Core committee meeting held on July 24, 2012. The standards were approved by the committee.

10.1.18 Preparation of Comprehensive Industry Document, Development of Emission and Effluent Standards for Single Super Phosphate Plants

Single Super Phosphate (SSP) Fertilizer industry is emerging fertilizer industry in the country and is a highly demanded fertilizer mostly used at the time of preparation of land for irrigation. SSP Contributes to increase crop production, but also its production process is major polluting one with respect to process emissions and disposal of hydrofluorsilicic acid

Basic environmental management practices followed by SSP units for controlling SPM are that Powdered rock phosphate are collected in the storage hopper through bag house and venture connected to stack. The Fluorine gas generated in mixing section is generally scrubbed, than flue gas is vented through chimney.

Beside these two pollutants scrubbed liquor is also formed during the process which is used for dilution of sulphuric acid and recycled back to process. Silica sludge generated is generally reused as a filler material.

The gaseous fluoride evolved during the production of single superphosphates may be disposed of by scrubbing it from the effluent gas streams with three stage scrubber and using the resulting scrubber liquors as sources of dilution water for the concentrated sulphuric acid used in the superphosphate manufacturing processes.

Part of the returned fluoride is recycled, which leads to higher fluoride contents and to be properly managed as some units are sending it for recycling to units engaged in sodium silicate manufacturing.

Matter for concern in SSP plants at present is that fluoride is emitted to environment through the process in the air through stacks, fugitive emissions and through effluents in the scrubbed liquid, silica sludge and as hydroflouorosilicic acid. Central Pollution Control Board has taken an in-house project to revise the standards for these industries.

In-house project for Development of Emission and Effluent Standards for Single Super Phosphate Plants is initiated. Data collected through questionnaires and dry visits is under compilation.

10.1.19 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 industries to 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 parameters of ES may be used as environmental performance indicators for relative comparison, implementation and to promote better practices.

In order to assess the efficacy of ES, a project "Review of Environmental Statements submitted by the industries", was undertaken by MoEF 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 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 up the environmental benchmarks for attainment by all the industries in the sector.

10.1.20 Preparation of Comprehensive Industry Document (COINDS) and the Status of Pesticide Industry

Comprehensive Industrial Document (COINDS) for Pesticide Industry was prepared in the year 1985-86 and revised during the year 1988-89. Further, the status of pesticide Industry was also prepared in the year 1993-94. In these documents, aspects of air pollution and solid waste were not covered. Later, source emission standards for inorganic parameters like HCl, Cl2, H2S, P2O5, NH3, HBr & Particulate Matter

and CH3Cl (organic) were notified during year 2006 and also incinerator emission standards were notified in the year 2008 for pesticide industry. Since then the sector has undergone changes in terms of raw material consumption, technological up-gradation, demand growth potential, and diverse product range. Also there is a need to re-look into the additional pollutants generated from pesticide industries other than the notified parameters & development of VOC emission standards. The existing document therefore needs to be upgraded to include new and developing technologies and their efficacy to treat various pollutants, also to include status of pesticide industries.

The Central Pollution Control Board (CPCB) intends to take up a project on "Preparation of Comprehensive Industrial Document (COINDS) on Pesticide industry" for execution through engagement of outside expert agency on MoU/ Agreement basis.

For this purpose, CPCB had advertised for inviting Expression of Interest (EOI) from Expert agencies/ Organizations. Based on the EOI submitted by various organizations, few of them have been qualified for submission of Technical & Financial Proposals.

10.1.21 Emission Standards of Petrochemical Industry

Petrochemical industry is concerned with the manufacture of various products and comprises multiple processing units at one specific location adopting different technologies, equipment, unit processes and unit operations from the basic feed stock. It leads to generation of a wide spectrum of emission of air pollutants, mainly of volatile organic compounds. Some of these pollutants are toxic and even carcinogenic, while others are responsible for damage to materials. Some pollutants also have potential for photochemical oxidant creation, global warming, ozone depletion or malodour creation. Besides, volatile organic compounds, there is generation of various types of inorganic hazardous air pollutants and conventional air pollutants. In order to reduce the air emission of these pollutants to an acceptable level, it is necessary to adopt a comprehensive approach considering possible "end of pipe" technologies, thermal destruction, and good engineering practices with due regard to techno-economic feasibility within the frame work of National Environment Policy (NEP), 2006.

With this backdrop, the Central Pollution Control Board in association with M/s Aditya Environmental Services, Mumbai and M/s Lurgi India Company Private Limited, New Delhi had taken up a study to develop national emission standard for petrochemical manufacturing units -basic and intermediate products. Considering the status of emission control by Indian industries and best practicable technology, and the doucument has been published in 2010 the proposed emission standards has been notified by MoEF on November 09, 2012.

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

Revision of emission standards for carbon disulphide (CS2) and hydrogen sulphide (H2S) 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 CS2 and H2S. This proposal addresses the revision and upgradation of the existing Comprehensive Industry Document (COINDS), first prepared in the year 1979-80 for liquid effluents in Manmade Fibre Industry. The objectives of study also include reviewing existing effluent standards for Rayon and Nylon Industry. The study has been completed and draft report has been prepared. The proposed standard will be placed in next peer and core meeting for review.

10.1.23 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 been completed and has also covered Kumbh Mela held at Haridwar during the period Jan-April 2010. The study report is under publication.

10.1.24 Performance Auditing of Environment Management at Indian Railways stations, Trains and Tracks"

Present study was done in-house by CPCB, Delhi in collaboration with its Zonal Offices. CPCB received letter from Principal Director of Audits, Indian Railways, wherein CPCB was asked to carry out performance audit of various environment management steps, those have been 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 at the station premises/ sidings/sheds. Six Zonal Offices of CPCB were asked to carry out study in the Railway Zones coming under their jurisdiction. The final compiled report of this study has been submitted to Indian Railways.

10.1.25 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 a 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

10.1.26 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, Haryana 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. Phase-I of project has been completed while phase-II of the project i.e. assessment of carbonyl and methane emissions from OEM (Original Equipment Manufacturer) CNG vehicles has also been completed and its reports is under finalization. The reports of both the phases will be consolidated and published.

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

This study has been awarded to the executing agency, (The Energy and Research Institute, New Delhi) during the year 2011. The objectives of this study includes Inventorization of Automobile manufacturing industries, process details of automobile manufacturing industry covering all categories of vehicles, identification of different sources of pollution for the automobile manufacturing industry, characterization of liquid effluent, gaseous emissions and hazardous wastes storage and disposal methods, resource recycling and waste minimization practice, 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 industry.

10.1.28 Status of the pollution generated from road transport sector in six cities

This study has been awarded to The Energy and Research Institute, New Delhi during the year 2011. 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 of vehicles (2 wheelers, 3-wheelers & 4 wheelers like cars, LCV, HCV, etc.) towards total vehicular emission load and identification of vehicle category contributing maximum total emission load. More cities are proposed to be covered during the next phase.

10.1.29 Development of guidelines for the Environmentally sound Recycling / disposal of ELVs (End of Life Vehicles)

An In-house study aiming at development of guidelines for environmentally sound of ELV's has been undertaken by Central Pollution Control Board 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 and development of guidelines for recycling/disposal of used vehicles

10.1.30 Guidelines for Phosphogypsum

Final draft "Guidelines on Management & Handling of Phosphogypsum generated from Phosphoric Acid Plants" were discussed in the TEC meeting held in June 2012 and the finalized guidelines were placed at Central Pollution Control Board website and also circulated to all the expert members and stakeholders for comments.

10.1.31 Review of CPCB guidelines on Common Bio-medical Waste Treatment Facilities

Central Pollution Control Board is in the process of reviewing the existing "Guidelines for Common Bio-medical Waste Treatment Facilities" in light of the proposed amendments to the Bio-medical Waste (Management & Handling) Rules, 1998.

CPCB has requested all the State Pollution Control Boards and Pollution Control Committee and stake-holders to provide their comments on the existing "Guidelines for Common Bio-medical Waste Treatment Facilities (CBWTFs)". In response, CPCB is in receipt of comments from the States of Andhra Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya and Orissa only. Further, reminders were issued to other SPCBs/PCCs, have not provided their comments.

10.1.32 Auditing of Pollution Under Control (PUC) Centers in various cities/ towns

Auditing of PUC centers in the cities of Kolkata, Chennai, Jaipur, Hyderabad etc has been taken up during the year with the objectives that, 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 while undertaking vehicle testing. This study shall also help to identify any scope for false passes, if present in the new system. The scope of the study also include checking of the testing instruments used and whether these have been certified by approving agencies and to assess the city-wise status of compliance of the vehicles with PUC norms.

10.1.33 Project on "Development of COINDS for Pickling Industries."

Pickling is a process of chemically removing oxides and scales from the surface of hot rolled steel by the action of water solution of inorganic acids. Oxide scale forms on the surface of the steel, when steel cools from a molten state. Depending on the type of product being processed, various acid such as sulphuric acid, hydrochloric acid, nitric acid, hydrofluoric acid and phosphoric acid are utilized either individually or in combination in both batch and continuous processes. Spent acid is discarded,

which forms a wastewater stream, commonly referred to as 'waste pickle liquor'. The pickled steel is then rinsed with water by sequential immersion in rinse tanks to remove acid. Acid fumes emit from the pickling tank. Central Pollution Control Board (CPCB) has taken up the project for development of Environmental Standards and Comprehensive Industry Documents for Pickling Industries.

The findings of the study reveals that Pickling Industries are highly polluting in nature. The Pickling process results in generation of water Pollution, Air pollution as well as hazardous solid waste. Highly acidic effluent is generated from washing of metal sheets subjected to acid treatment, Effluent contain high concentration of Fe, Ni, Cr and their compounds. Acid fumes emanates from the acid tank, which are taken to scrubber by some of the units. Air pollution is also caused by Annealing process, where metal sheets are heated in LDO fired furnace before their rolling. The Comprehensive Industry Document proposed to be prepared based on the findings of in-depth study and Environmental Standards proposed.

10.1.34 Project on Environmental management in Bee-hive Coke Oven Plants.

Central Pollution Control Board (CPCB) has taken up the project for development of Environmental Standards and Comprehensive Industry Documents for Bee-hive Coke Oven Plants. There are about 205 Bee-hive Coke Oven plants in the country. In the coke-making process, bituminous coal is fed into a series of ovens, which are sealed and subsequently burnt at high temperature of about 12000C in an Oxygen (O2) deficit atmosphere, for 24 to 36 hours. Coke is a solid carbonaceous material.

Primarily following Environmental Issues prevails in the Bee-hive Coke Oven Plants:

Air Emissions

- Emissions from Coal Crushing Unit (Particulate emissions)
- Fugitive Emissions while charging the Pulverized Coal to Ovens; (Particulate matter, CO2, CO, SO2 and NOx)
- Gaseous emission from Coke Ovens

Particulate Matter, polycyclic organic matter from coal tar pitch volatiles, beta-naphthylamine, benzene, arsenic, beryllium, cadmium, chromate, lead, nickel subsulfide, nitric oxide and sulfur dioxide);

Water pollution

- Water is used for quenching of Coke which is recycled and reused.

In-depth study in selected Bee-hive Coke Oven Plants is under process. Based on the findings of the study, the report will be prepared.

10.1.35 Project on Development of COINDS for Steel Re-rolling Mills.

Central Pollution Control Board (CPCB) has taken up the project for development of Environmental Standards and Comprehensive Industry Documents for Steel Re-rolling Mills. There are about 2100 Steel Re-rolling Mills in the country. The process of Steel Re-rolling involves hot rolling & cold rolling of different sizes of ingots and billets to prepare desirable sizes of stainless steel sheets. Under this project, in-depth studies have been undertaken in selected Steel Re-rolling Mills. The findings of the in-depth study reveals that Steel Re-rolling Mills are Air Polluting in nature. The Air Pollution is caused by furnace, which is fired with either pulverized coal or furnace oil or producer gas produced in coal gasifier. Water is used in the process for cooling process, which is recycled and reused.

Based on the in-depth study, final Report has been prepared, which includes process details, monitoring data of various sources of waste water generation, air emission, waste minimization options, cleaner Technologies for control of pollution and safety guidelines.

10.1.36 Project on Development of COINDS for Hot Mix Plants.

Central Pollution Control Board (CPCB) has taken up the project for development of Environmental Standards and Comprehensive Industry Documents for Hot Mix Plants. The process of Hot Mix plant involves preparation of mixture of aggregates and asphalt, which are heated, then mixed in measured quantities.

The process of Hot Mix Plant results in air Pollution as it involves handling and processing of large quantities of aggregate with bitumen. The major sources of fugitive emission/particulate in Hot Mix Plant are as follows:

a. Material handling and its storage;

b. Bitumin storage and its heating; and

c. Particulate and gaseous emission from Dryer unit.

The in-depth studies being taken –up in selected Hot Mix Plants and thereafter the Comprehensive Industry Documents (COINDS) will be prepared along with formulation of environmental Standards.

CHAPTER XI

PROSECUTIONS LAUNCHED, CONVICTIONS 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 randomly selected through 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 (CPCB) located at Bengaluru, Vadodara, Lucknow, Bhopal, Shillong and Kolkata.

Overall 251 industries were inspected during the year 2012-13. State wise number of industries inspected during the year 2012-13 is presented in Table 11.1 & Table 11.2:

Table 11.1 State wise Number of inspections undertaken under Environment Surveillance Scheme (ESS) during year 2012-2013

State	No. of Inspections
Andhra Pradesh	12
Arunachal Pradesh	2
Assam	16
Bihar	2
Chhattisgarh	4
Gujarat	16
Haryana	8
Himachal Pradesh	4
Jharkhand	2
Karnataka	8
Kerala	8
Madhya Pradesh	8
Maharashtra	32
Nagaland	1
Meghalaya	3
Orissa	12
Punjab	9
Rajasthan	36
Tamil Nadu	16
Uttar Pradesh	15
Uttarakhand	6
West Bengal	27
Goa	4
Total	**251**

Table 11.2: Sector wise number of industries inspected during the year 2012-13

Sector	No. of inspections
Asbestos Roofings/ Cement Sheets	2
Beverage	1
Cement	33
Chlor Alkali	3
Copper	1
Distillery	29
Dye & Dye Intermediates	6
Fertilizer	20
Iron & Steel	11
Milk Products	1
Oil Refinery/ Oil-Gas Drilling	6
Pesticide	6
Petrochemicals	9
Pharmaceuticals	28
Pulp & Paper	17
Plywood	2
Steel- Rerolling & Small Scale Ferrous Industries	2
Sugar	25
Sugar & Distillery	2
Tannery	7
Textile	2
Thermal Power Plants (including Captive Power Plants)	33
Coal Mining	1
Lead Acid Batteries	3
Zinc	1
Total	**251**

Based on the inspection reports, Directions/Advices have been issued to the concerned SPCBs/industries on severity of violations either under Section 18(1)(b) of the Water (Prevention and Control of Pollution) Act, 1974/Air (Prevention and Control of Pollution) Act, 1981 or under Section 5 of the Environment (Protection) Act, 1986.

TABLE 11.3: Summary of action taken against defaulting Industries during the year 2012-13

Year	No. of directions issued to the units under Section 5 of EPA			No. of directions issued to the SPCBs/ PCCs for units under section 18(1)(b) of the Water/ Air Acts		
	No. of Directions for compliance	No. of directions for Closure	Total	No. of Directions for compliance	No. of directions for Closure	Total
2012-13	190	54	244	30	8	38

Note- The above details include directions/notices issued in case of inspections carried out under NGRBA activities also.

11.2 17 CATEGORIES OF HIGHLY POLLUTING INDUSTRIES

17-Categories of Industries have been identified by Ministry of Environment & Forests, Govt. of India as highly polluting and covered under the Central Action Plan. A 15-point programme, for priority action, was formulated by the Ministry of Environment and Forests (MoEF). The programme is rigorously followed up by the Central Pollution Control Board. The status of these highly polluting industries is regularly obtained from respective State Pollution Control Boards and compiled. The sector-wise and the state-wise status of these industries as on 31st March, 2013 is presented in Table 11.4 & 11.5 respectively

TABLE 11.4: Sector-wise summary status of industries in 17 categories (as on March 31, 2013)

S. No.	Sector	Complying	Non Complying	Closed	Total
1	Aluminium	6	2	2	10
2	Cement	238	44	22	304
3	Chlor Alkali	25	4	2	31
4	Copper	4	1	1	6
5	Distillery	221	52	41	314
6	Dye & DI	125	5	9	139
7	Fertilizers	76	4	17	97
8	Iron & Steel	152	81	17	250
9	Oil Refinery	21	3	0	24
10	Pesticide	76	3	13	92
11	Petrochemical	33	5	3	41
12	Pharmaceutical	534	38	61	633
13	Power Plant	210	88	10	308
14	Pulp & Paper	172	37	35	244
15	Sugar	302	202	92	596
16	Tannery	101	18	35	154
17	Zinc	6	1	0	7
		2302	**588**	**360**	**3250**

TABLE 11.5 : State-wise summary status of industries in 17 categories (as on March 31, 2013)

S. No.	State	Complying	Non Complying	Closed	Total
1	Andhra Pradesh	359	74	39	472
2	Arunachal Pradesh	2	0	0	2
3	Assam	36	12	1	49
4	Bihar	16	4	0	20
5	Chhattisgarh	71	6	1	78
6	Chandigarh	0	0	0	0

S. No.	State	Complying	Non Complying	Closed	Total
7	Daman & Diu	2	0	1	3
8	Delhi	2	0	0	2
9	Goa	14	0	1	15
10	Gujarat	302	7	8	317
11	Haryana	114	4	14	132
12	Himachal Pradesh	14	0	3	17
13	Jharkhand	104	47	22	173
14	Jammu & Kashmir	7	0	3	10
15	Karnataka	102	49	32	183
16	Kerala	22	14	15	51
17	Lakshadweep	0	0	0	0
18	Madhya Pradesh	65	16	2	83
19	Maharashtra	317	145	58	520
20	Meghalaya	13	1	0	14
21	Mizoram	1	0	0	1
22	Nagaland	0	0	0	0
23	Orissa	37	17	11	65
24	Puducherry	5	2	0	7
25	Punjab	52	16	19	87
26	Rajasthan	69	31	18	118
27	Sikkim	3	1	0	4
28	Tamil Nadu	210	10	11	231
29	Tripura	11	1	5	17
30	Uttar Pradesh	278	45	78	401
31	Uttarakhand	25	19	5	49
32	West Bengal	49	67	13	129
	Total	**2302**	**588**	**360**	**3250**

11.3 INDUSTRIAL POLLUTION CONTROL ALONG THE RIVERS AND LAKES

Central Pollution Control Board had initiated a programme to identify and inventorise polluting industries located along the rivers in the country for priority actions in the year 1993-94, for control of industrial discharges into rivers. While the process of inventorization continued, the National River Conservation Authority (NRCA) in its meeting held on July 12, 1997 under the Chairmanship of the Hon'ble Prime Minister decided that the polluting industries, which are discharging their effluents into the rivers and lakes should be directed to install the requisite effluent treatment systems within three months, failing which closure notices should be issued. Accordingly, Chairman, Central Pollution Control Board at the instance of MoEF, issued directions under Section 18(1) (b) of The Water (Prevention & Control of Pollution) Act, 1974, to all the SPCBs/PCCs on July 14, 1997, requiring them to inventorise the list of

Grossly Polluting Industries (industries discharging 100 kg per day or more of BOD) and take necessary action against the defaulting industries.

The programme is being continued since then, and regularly monitored with feedback from State Pollution Control Boards / Pollution Control Committees. Direct actions against the defaulter industries are also being taken by Central Pollution Control Board, as and when needed. The State–wise status of grossly polluting industries in various States and Union Territories are summarized in Table 11.6

Table 11.6: State wise status of Grossly Polluting Industries discharging their effluents in Rivers and lakes (As on March 31, 2013)

S. No	State	Number of industries	Complying	Not Complying	Closed	Information not available
1	Andhra Pradesh	16	9	6	0	1
2	Bihar	22	16	1	5	0
3	Assam	9	4	5	0	0
4	Chandigarh	0	0	0	0	0
5	Daman & Diu	3	0	0	0	3
6	Goa	2	2	0	0	0
7	Gujarat	3	2	1	0	0
8	Haryana	53	40	13	0	0
9	Himachal Pradesh	6	6	0	0	0
10	Jharkhand	5	4	1	0	0
11	Karnataka	10	8	0	2	0
12	Kerala	2	2	0	0	0
13	Madhya Pradesh	1	0	1	0	0
14	Maharashtra	2	1	0	1	0
15	Mizoram	0	0	0	0	0
16	Nagaland	0	0	0	0	0
17	Orissa	20	6	8	5	1
18	Puducherry	1	1	0	0	0
19	Punjab	7	4	3	0	0
20	Sikkim	1	0	1	0	0
21	Tamil Nadu	1	1	0	0	0
22	Tripura	0	0	0	0	0
23	Uttar Pradesh	594	410	65	119	0
24	Uttarakhand	50	25	18	6	1
25	West Bengal	31	22	1	8	0
	TOTAL	**839**	**563**	**124**	**146**	**6**

Note: *Information on status of operation of Effluent Treatment Plant in Grossly Polluting Industries not provided by eight SPCBs/PCC viz. Delhi, Rajasthan, Arunachal Pradesh, Jammu & Kashmir, Meghalaya, Manipur, Lakshadweep and Andaman & Nicobar.*

11.4 SURVEY OF INDUSTRIES IN 'NO DEVELOPMENT ZONE' AROUND NUMALIGARH REFINERY LIMITED, ASSAM

Ministry of Environment & Forests (MoEF) has notified a 'No Development Zone' (NDZ) under the Environment (Protection) Act, 1986 on 5th July 1996 around the Numaligarh Refinery Limited (NRL), Numaligarh, Assam, with a radius of 15 km around the refinery site except towards North West where the `No Development Zone` is extended right up to the eastern boundary of Kaziranga National Park (KNP) vide gazette Notification No. SO. 481 (E), in order to restrict the establishment of new industries in the area, keeping in mind the pollution threat to the Kaziranga National Park.

An application was filed by one Shri Rohit Choudhury before the National Green Tribunal (NGT) against setting up and operation of various industries within the NDZ (OA 38/2011: Rohit Choudhury Vs Union of India & others). Union of India through MoEF, a respondent in this matter, requested that Central Pollution Control Board (CPCB) should carry out a study about the present industrial activities in the area and submit its report in line with the orders dated 19.04.2012 & 23.05.2012 of NGT. NGT in its order dated 19.04.2012 directed that there should be an independent report with location of industries in a map, which are operating in the NDZ. NGT also desired that the report include pollution control status of the industries, which are located within the NDZ and up to a distance of 500 m from the boundary of NDZ.

In compliance of the NGT directives, area under the NDZ was surveyed by Central Pollution Control Board, Zonal Office Shillong during June 2012. The industries, either in operation or being set up in NDZ, may be broadly categorized in the following categories:

i) Stone crushers;

ii) Tea leaves processing factories with or without captive tea gardens;

iii) Brick kilns;

iv) Wood based industry/saw mill &

v) Miscellaneous (mustard oil mill, flour mill, saw mill, hotel/lodge etc).

A total number of 114 industries were surveyed and plotted in maps showing these industries in and around the no development zone of 15 km radius around the refinery. The industries include Stone Crushers (44), Brick kilns (34), Tea Gardens and factories (25) and other miscellaneous industries (11). Visit to the polluting industries and discussions with the industries during the visit towards better environmental management have resulted in significant improvement in environmental management in various industrial units. Most of the tea factories/ gardens in the area were operating DG set without acoustic enclosure but after the visit the units have retrofitted acoustic enclosures in the DG sets.

11.5 COMPREHENSIVE ENVIRONMENTAL ASSESSMENT OF INDUSTRIAL CLUSTERS

During year 2009-10, Central Pollution Control Board (CPCB) in collaboration with Indian Institute of Technology (IIT), Delhi has carried out comprehensive environmental assessment of 88 prominent industrial clusters based on Comprehensive Environmental Pollution Index (CEPI) criteria. Out of identified 88 prominent industrial clusters, 43 industrial clusters in 16 States having CEPI score of 70 or above have been identified as Critically Polluted Industrial Clusters. The state-wise details of these 43 critically polluted areas are presented in Table 11.7

Table 11.7 : State-wise Details of Critically Polluted Areas

S. No.	State/Union Territory	Critically Polluted Areas
1.	Gujarat (6 CPAs)	Ankleshwar, Vapi, Ahmedabad, Vatva, Bhavnagar, Junagarh
2.	Maharashtra (5 CPAs)	Chandrapur, Dombivalli, Aurangabad, Navi-Mumbai, Tarapur
3.	Tamil Nadu (4 CPAs)	Vellore North-Arcot, Cuddalore, Manali, Coimbatore
4.	Madhya Pradesh (1 CPA)	Indore
5.	Punjab (2 CPAs)	Ludhiana, Mandi-Gobindgarh
6.	Jharkhand (1 CPA)	Dhanbad
7.	Delhi (1 CPA)	Najafgarh drain basin
8.	Kerala (1 CPA)	Greater Cochin
9.	Karnataka (2 CPAs)	Mangalore, Bhadravati
10.	Andhra Pradesh (2 CPAs)	Vishakhapatnam, Patancheru-Bollaram
11.	Orissa (3 CPAs)	Angul Talcher, Ib-Valley and Jharsuguda
12.	West Bengal (3 CPAs)	Haldia, Howrah, Asansol
13.	Uttar Pradesh (6 CPAs)	Ghaziabad, Singrauli, Noida, Kanpur, Agra, Varanasi-Mirzapur
14.	Rajasthan (3 CPAs)	Jodhpur, Pali, Bhiwadi
15.	Haryana (2 CPAs)	Faridabad, Panipat
16.	Chhattisgarh (1 CPA)	Korba

Subsequently, Ministry of Environment & Forests, Government of India has imposed temporary moratorium on consideration of new projects /expansion of existing projects for environmental clearance to be located in Critically Polluted Areas, vide Office Memorandum, dated 13.01.2010.

11.6 STATUS OF MORATORIUM IN CRITICALLY POLLUTED AREAS

The moratorium in 43 critically polluted areas was imposed by Ministry of Environment & Forests (MoEF) vide Office Memorandum dated 13.01.2010. Subsequently, MoEF decided to lift the moratorium on the basis of statements furnished by concerned State Pollution Control Boards, to the effect that some work has been initiated in line of the submitted action plans. Therefore, the SPCBs were directed to submit the progress reports on the initiation of implementation of Action Plans. Based on

the inputs received from SPCBs on initiation of ground work in implementation of action plans, MoEF lifted the moratorium from following 26 Critically Polluted Areas, vide Office Memorandum dated 26.10.2010, 15.02.2011, 31.03.11, 23.05.2011 & 05.07.11 respectively:

Clusters (five) from where moratorium was lifted in October 2010

- Patancheru-Bollaram (AP)
- Mandi Govindgarh (Punjab)
- Vapi (Gujarat)
- Tarapur (Maharashtra),
- Coimbatore (Tamil Nadu)

Clusters (eight) from where moratorium was lifted in February 2011

- Navi Mumbai (Maharashtra)
- Dombivali (Maharashtra) t
- Aurangabad (Maharashtra)
- Ludhiana (Punjab)
- Agra (UP)
- Varanasi-Mirzapur (UP)
- Cuddalore (Tamil Nadu)
- Bhavnagar (Gujarat)

Clusters (seven) from where moratorium was lifted in March 2011

- Indore (M.P)
- Angul-Talcher (Orissa)
- Faridabad (Haryana)
- Panipat (Haryana)
- Ghaziabad (UP)
- Noida (UP)
- Junagadh (Gujarat)

Clusters (three) from where moratorium was lifted in May 2011

- Bhadravati (Karnataka)
- Mangalore (Karnataka)
- Greater Kochi (Kerala)

Clusters (three) from where moratorium was lifted in July 2011

- Ib Valley (Orissa)
- Jharsuguda (Orissa)
- Singrauli (UP & MP part)

Subsequently, meetings of the Technical Review Committee (TRC) were held during August 29-30, 2011 at Central Pollution Control Board HQs to review the progress made in the implementation of the Action Plans in CPAs. A workshop was also held by CPCB on September 14, 2011 to review the progress in the 26 CPAs, where moratorium has been lifted.

11.7 ENVIRONMENTAL QUALITY MONITORING IN CRITICALLY POLLUTED AREAS

Central Pollution Control Board had engaged Third Party agencies, i.e. M/s SGS India Pvt. Ltd. and M/s Vimta Labs for monitoring of Air, Water and Ground water quality of all the 43 Critically Polluted Areas during February–March, 2011. The monitoring results have been uploaded on the website of CPCB for information. Recently, another round of monitoring has been carried out again through third party namely M/s Bhagwathi Ana Labs during Feb.-Mar., 2013 and the soft copies of monitoring reports have been received by CPCB for records and reference.

11.8 PERIODIC ASSESSMENT OF CEPI IN INDUSTRIAL CLUSTERS

The assessment of CEPI is a dynamic process and based on the annual average data bank, CEPI may be calculated regularly so that the impact and effect of enforcement could be evaluated in terms of improvement in environmental quality of selected industrial clusters.

The industrial cluster-wise details of the CEPI Scores observed during interim assessment carried out by CPCB using the monitoring data recorded during Feb.-Mar., 2013 are arranged in the alphabetical order and presented in Table 11.8.

Table 11.8 : Interim assessment of CEPI-2013 (Alphabetical order)

S. No.	Industrial Cluster/Area	AIR	WATER	LAND	CEPI
1	Agra (Uttar Pradesh)	57.00	55.00	49.50	68.71
2	Ahmedabad (Gujarat)	49.75	60.50	46.00	69.54
3	Angul Talcher (Orissa)	61.75	60.50	48.00	72.86
4	Ankleshwar (Gujarat)	67.50	68.75	57.75	80.93
5	Asansol (West Bengal)	47.38	40.50	40.50	56.01
6	Aurangabad (Maharashtra)	56.75	55.50	50.50	68.87
7	Bhadravati (Karnataka)	37.38	35.50	35.50	45.27
8	Bhavnagar (Gujarat)	30.75	57.50	40.50	62.79
9	Bhiwadi (Rajasthan)	62.75	46.00	46.00	70.63
10	Chandrapur (Maharashtra)	51.75	50.50	75.50	81.90
11	Coimbatore (Tamil Nadu)	32.38	48.00	30.50	53.14
12	Cochin, Greater (Kerala)	48.00	45.50	42.00	57.94
13	Cuddalore (Tamilnadu)	45.50	53.50	60.50	70.12

S. No.	Industrial Cluster/Area	AIR	WATER	LAND	CEPI
14	Dhanbad (Jharkhand)	50.50	47.00	63.00	71.78
15	Dombivali (Maharashtra)	51.00	64.50	43.00	72.29
16	Faridabad (Haryana)	46.00	67.50	40.50	73.55
17	Ghaziabad (Uttar Pradesh)	69.50	76.00	48.75	84.13
18	Haldia (West Bengal)	48.75	50.00	47.50	61.58
19	Howrah (West Bengal)	43.00	51.00	48.00	61.11
20	Indore (Madhya Pradesh)	65.00	70.50	43.00	78.75
21	Ib Valley (Orissa)	48.00	48.00	47.00	59.73
22	Jharsuguda (Orissa)	65.00	50.50	47.00	73.31
23	Jodhpur (Rajasthan)	57.50	50.50	69.00	78.00
24	Junagarh (Gujarat)	42.75	40.00	43.00	52.75
25	Kanpur (Uttar Pradesh)	55.00	64.50	40.00	72.31
26	Korba (Chhatisgarh)	59.50	47.00	50.50	69.11
27	Ludhiana (Punjab)	49.50	68.00	48.75	75.72
28	Manali (Tamilnadu)	55.50	69.00	48.00	77.26
29	Mandi Gobind Garh (Punjab)	55.00	67.00	60.50	77.98
30	Mangalore (Karnataka)	54.75	58.25	41.00	67.62
31	Navi Mumbai (Maharashtra)	47.00	66.00	43.00	72.87
32	Nazafgarh drain basin (including Anand Parvat, Naraina, Okhla and Wazirpur), Delhi	56.88	57.50	60.50	73.42
33	Noida (Uttar Pradesh)	50.00	72.50	45.00	78.69
34	Pali (Rajasthan)	54.00	72.50	68.75	82.71
35	Panipat (Haryana)	48.25	76.00	45.50	81.27
36	Patancheru- -Bollaram (Andhra Pradesh)	62.50	67.25	43.00	76.05
37	Singrauli (Uttar Pradesh)	68.00	70.50	63.50	83.24
38	Tarapur (Maharashtra)	58.00	63.00	48.00	73.30
39	Vapi (Gujarat)	51.75	79.50	54.75	85.31
40	Varansi-Mirzapur (Uttar Pradesh)	44.00	47.00	42.50	56.91
41	Vatva (Gujarat)	43.00	80.00	40.00	83.44
42	Vellore (North Arcot) (Tamilnadu)	59.75	71.50	48.00	79.67
43	Vishakhapatnam (AndhraPradesh)	38.00	43.00	43.00	52.31

11.9 DEVELOPMENT OF CEPI SOFTWARE

A software has been developed by Central Pollution Control Board through M/s DOEACC Society, Chandigarh for web-based online calculation of CEPI, which would be shared with SPCBs / public. The software would enable the concerned SPCBs / PCCs / common people to recalculate the CEPI for their area on regular basis to ensure better enforcement and compliance. The software would further help SPCBs / PCC in keeping a constant vigil on environmental pollution thereby, preventing its degradation. A training programme on the demo-software was organized at CPCB, Delhi during Jan. 23-24, 2012 which was attended by the officers from various SPCBs and Zonal offices of CPCB. The software has already been developed and its safety audit is under progress.

11.10 MONITORING OF NATURAL DRAINS

Monitoring of Natural Drains, River located in the Critically Polluted Areas (CPA) Ankleshwar and Vapi viz Amla Khadi, Chhapra Khadi, and Damanganga River were carried out under quarterly monitoring programme. Monitoring results have been compiled in the database managed for the critically polluted area.

Table 11.9 Water Quality of the Amlakhadi for the year 2012-13 at Ankleshwar (Sampling was carried out near NH-8, Mumbai-Ahmedabad, Ankleshwar)

Date	pH	TSS	TDS	BOD	COD	O & G	NH3-N	CN
28.04.2012	7.48	38	701	27	102	5.8	12.6	--
08.08.2012	7.27	61	841	39	180	6.7	12.5	0.31
06.12.2012	7.41	100	752	24	87	4.1	10.8	0.12
27.02.2013	8.04	85	936	19	82	9.4	13.4	--

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

Table 11.10 Water Quality of the Chhaparakhadi (Meeting Narmada River U/S of Golden Bridge)

(Sampling carried out, near bridge on road towards Chhapara Village, near Ankleshwar-Bharuch Road)

Date	Parameter(s)								
	pH	TSS	TDS	BOD	COD	NH3-N	S- -	Phenols	CN-
28.04.2012	7.76	30	2202	19	89	47.6	0.15	0.197	0.11
08.08.2012	7.40	68	2136	26	264	26.8	1.0	4.21	0.092
06.12.2012	7.75	64	2464	48	182	21.3	0.98	0.07	0.16
27.02.2013	8.24	16	3146	30.4	221	49.3	1.82	0.14	--

• *All the parameters except pH are expressed in mg/l.*

RIVER DAMANGANGA WATER QUALITY IN VAPI-DAMAN REGION (Year 2012-2013)

Sampling Locations	Date of monitoring	Parameters						
		pH	DO	TDS	BOD	COD	NH3-N	Phenols
Damanganga River, GIDC Weir, U/S of CETP discharge	20.06.12	7.14	7.8	242	2.1	8.2	0.05	0.104
	05.09.12	6.47	6.53	175	2.1	7.4	BDL	0.15
	05.12.12	8.40	8.2	191	2.8	9.8	0.80	BDL
	26.02.13	8.68	8.5	164	1.2	4.3	0.45	0.04
Damanganga River near Jari Causeway	21.06.12	6.47	0.44	16248	5.1	104	8.6	BDL
	05.09.12	6.70	8.47	138	1.41	4.2	1.1	0.18
	05.12.12	7.62	4.80	3779	3.8	143	1.9	0.082
	26.02.13	7.88	3.7	5242	2.3	42.3	2.84	0.065

Sampling Locations	Date of monitoring	Parameters						
		pH	DO	TDS	BOD	COD	NH3-N	Phenols
Damanganga River, Near bridge joining Moti Daman & Nani Daman, near mouth of Damanganga Estuary	21.06.12	6.65	3.7	28671	6.4	85	5.04	BDL
	05.09.12	7.12	8.29	158	0.85	4.2	0.58	0.05
	05.12.12	7.54	5.9	20212	6.2	309	0.69	0.026
	26.02.13	7.95	5.5	20714	2.8	121.1	2.34	0.05

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

11.11 PUBLIC COMPLAINTS INVESTIGATED UNDER VIP REFERENCE

11.11.1 Public Complaints Investigated At Zonal Office-Bangalore

A. M/s. Sterlite industries (India) Limited, Thoothukudi, Tamil Nadu

With the VIP reference, M/s Sterlite Industries (India) Limited was inspected and the report submitted to Supreme Court. Subsequently on the Supreme Court Direction, joint inspection was carried out by CPCB, TNPCB & NEERI, and 30 action points were proposed to implement by the unit on fugitive emission control, source emission, material handling, green belt development, air quality monitoring, wastewater treatment, wastes etc., which are implemented by the unit. The court as part of the environment commitment of the company asked to deposit ₹ 100 crore to the collector, Tuticorin, the same will be kept in a Bank and the interest will be used to improve the environment of Tuticorin.

B. M/s Dharangadhar Chemical Works (DCW) Limited, Thiruchendur, Tamil Nadu

- The unit was operating without valid consents under the Water & Air Act and HWM Authorization, the unit has been directed to obtain consents and HWM Authorization.
- The unit has solar evaporation ponds at two locations to discharge their High TDS effluents. Adjacent to plant 08 solar evaporation ponds are existing in 12 acres. These solar evaporation ponds are used for disposal of leach liquor from Ilmenite plant. Due to shallow depth and topographical features. The effluent overflow into storm water drain, during rainy period which ultimately joins the creek. Due to this creek water turns red in colour and also pH of the creek water found in the range of 2.0 - 2.2.
- The accumulation of iron sludge was found in creek.

C. M/s CIPSA – RIC India Ltd. Tumkur, Karnataka:

- The unit was found operating without valid consents under the Water & Air Act.
- At the time of inspection the process effluent was not entering into ETP though process was in operation, the unit was found having bypass arrangements to discharge their untreated effluent into the drain.

- The existing ETP of the unit was found not adequate.
- Due to discharge of untreated effluent into drain and nearby land surrounding ground water found contaminated.
- The existing APCD also found not adequate and stack height and plate form are not provided as per Emission Regulation Part III for monitoring the emissions

11.11.2 Public Complaints Investigated at Zonal Office-Lucknow

A. M/s New India Sugar Mills, Kushinagar (UP)

- The unit is engaged in production of Sugar using sugarcane as raw material with installed capacity of 7000 TCD (Ton Cane Crushed Per Day).
- During inspection, unit was not in operation due to non-crushing season. As informed by the unit representative, unit is not in operation since 20.03.2012.
- The unit is meeting its fresh water requirement through two bore wells. No water meter is installed at the bore wells.
- The unit has installed Effluent Treatment Plant(ETP) with capacity of 1000 KLD which comprise of Oil and Grease Skimmer, Chemical Mixing Tank, Equalization Tank, Primary Clarifier, Aeration Tank(Diffuse Type),Secondary Clarifier, Sand Filter and Activated Carbon Filter. During inspection, ETP was not in operation. No flow measuring device was installed at the outlet of ETP.
- Unit has installed separate energy meter at the ETP and maintains log book for the energy and chemical consumption in the ETP.
- Treated effluent is discharged into the nalla, which meets Majhna nalla after traversing approx.14 km. Majhna nalla meets Bathuwa River after traversing approx. 20 km at Rudrapur and ultimately meets Rapti River at Gola, Madanpur (District-Deoria) after traversing approx.18 km. During the inspection, industry nalla at the confluence point of Majhna nalla having less flow and Bathuwa River was found dry at confluence point of Majhna nalla and Bathuwa River. Stagnant pool of effluent in the drain near industry was observed.
- It is evident from the results that the industry drain has high colour and Suspended Solids, which indicates a sequential effluent discharge. However, water quality of Majhna nalla after mixing industrial drain at Karjahan & Rudrapur was found with no significant impact of industrial discharge.
- Unit is partially recycling the treated effluent from the ETP in spray pond and gardening.
- It is evident from the results that unit is not meeting with the stipulated norms of effluent discharge and thus poses pollution in the nalla.

B. Investigation of pollution due to industries located in Raibareilly (UP).

VIP reference complaint has been investigated regarding issues raised by Smt. Maneka Gandhi about pollution due to industries located in Raibarelly region (UP). A team of CPCB, Z.O, Lucknow and UPPCB, Raibarelly jointly carried out a detailed review of status in successive phases during the year. It was noted that one industry M/s Nandganj Sihori Sugar Company Limited, Daryapur, Raibareilly was closed and two other units viz. M/s Indian Telephone Industries, Raibareilly and M/s Shree Bhawani Paper Mills Limited, Raibareilly were operational. The following are the observations/recommendations :

a. M/s Nandganj Sihori Sugar Company Limited, Daryapur, Raibareilly.

M/s Nandganj Sirohi Sugar Company Limited is located at Daryapur, Raibareilly (UP) with installed crushing capacity of 1500 TCD. During inspection, unit was not in operation and as per information given by the unit representative, unit is not in operation since January, 2009 (2009-10 crushing season) due to non-availability of raw material (sugar cane).

b. M/s Indian Telephone Industries, Raibareilly (UP).

The unit is engaged in manufacturing of Electronic Telecommunication Equipments with installed capacity of 600 system/month. During manufacturing of Electronic Telecommunication Equipments, electroplating of equipment is carried out. The installed capacity of Zinc Plating is 40000 m2/annum, Anodizing is 10,000 m2/annum and acid plating is 2000 m2/annum. During inspection, unit was not in operation. As informed by the unit representative, unit is not in operation since September, 2012, due to no work order.

c. M/s Shree Bhawani Paper Mills Ltd., Raibareilly.

- The unit is engaged in the production of Writing & Printing Paper, Newsprint with installed capacity of 50 TPD (Agro based) and 100 TPD (Waste Paper based) using Indian waste paper, imported waste paper (for waste paper based plant) and rice straw, wheat straw, bagasse (for agro based plant) as raw material. During inspection, waste paper based plant was in operation with present capacity of 75 TPD, while agro based plant was not in operation.
- The characterization of treated effluent indicated that the unit is meeting with the stipulated norms of effluent discharged but the MLSS is very less at the aeration tank which indicates that ETP is not stabilized
- Unit has installed conventional Chemical Recovery Plant (CRP) with capacity of 80 TPD of black liquor solids firing per day. During inspection, CRP was not in operation.

The unit was issued direction under section 5 of the E(P) Act,1986 on 13.09.2012. The status of directions issued are as indicated in Table 11.12 :

Table 11.12 : Status of Direction and Compliance at Paper Mill at Raibareilly

S. No.	Directions	Compliance Status
1.	The unit shall not start agro based production till Chemical Recovery Plant (CRP) is fully established. The unit shall seek permission from CPCB to start agro based production after the installation of CRP.	During inspection, CRP was not in operation and agro based plant was also found non-operational.
2.	The unit shall evaluate its ETP with regard to its treatment capacity & the effluent generated and shall submit ETP adequacy report within 15 days.	Complied.

d. Monitoring of Behta Nalla:

Behta nalla carries the industrial effluent load from M/s ITI Ltd. and M/s Shree Bhawani Papers Mills Ltd. as well as domestic sewage from the colonies of M/s ITI Ltd. and city sewage of Raibarely. Effluent characterization of the drain reveals that the effluent quality does not meet with the general standards for discharge. It may be due to untreated/partially treated/treated effluent discharge from the units and sewage generated from the city.

e. Monitoring of River Sai:

Monitoring of River Sai was carried out at three locations- upstream of Raibarelly at Sirsa Ghat; Rajghat in Raibarelly after mixing of City drain ; downstream of Raibarelly at picnic spot located approx. 03 km away.

Water quality data reveals that the quality of River Sai at the upstream belong to the "B" class of designated best use classification except BOD and pH which is slightly higher. But the water quality of River Sai after mixing of City drain and at the down-stream of Raibarelly belong to the "C" class except BOD. High BOD may be due to mixing of city drain and Behta nalla.

11.11.3 Public Complaints Investigated at Zonal Office- Vadodara

The inspection cum monitoring of industries carried-out to address the public complaints received from Member of Parliament in Gujarat, Maharashtra and UT's of Daman & Diu and Dadra & Nagar Haveli is given below.

A: M/s. Bhusawal Thermal Power Station, Deep Nagar, Bhusawal, District Jalgaon, Maharashtra

A public compliant was addressed to MoEF, New Delhi by Ex-Chairman, Panchayat Samiti, Bhusawal and the same complaint letter was forwarded through, Hon'ble Member of Parliament (Lok Sabha), Jalgaon regarding the violation of Environmental Act by M/s Bhusawal Thermal Power Station, Deepnagar, Tal: Bhusawal, Dist: Jalgaon, Maharashtra. The salient findings of the inspection are as below :

- The monitoring results of ash bund (phase 3) seepage shows the concentration of measured parameters in a grab sample within consent limits prescribed by MPCB. Additionally, the same grab sample was analysed for Mercury and the concentration of Mercury was found to be 0.00191 mg/L.
- Based on observations drawn during visit to ash bund area, it was clear that there were leakages of wet ash from existing pipelines of units 2 & 3 at several places and deposited along the boundary of agricultural field(s) & in the natural drain(s)/culvert(s). Hence might affect the natural carrying capacity of drain/ culvert which is meant for irrigating water to agricultural fields. Also, during gusty situations the fines might deposit on plantation(s).

B: M/s. Tata Cement Company, Muthapur, Gujarat

Complaint was received vide letter dated 30th August, 2011 against M/s Tata Cement Company, Mithapur, Gujarat. In this regard, Gujarat Pollution Control Board was requested to look into the matter and send the action taken report. The Gujarat Pollution Control Board visited the TCL, Mithapur and issued Notice to the unit under section 31(A) of the Air Act and action taken report was sent to this office. As requested by head Office, this office visited the above unit on February 01 & 02, 2012 to investigate the complaint and based on the visit report, GPCB was advised to ensure implementation of recommendations. GPCB has submitted their reply (dated Aug 2012) stating that the CPCB recommendations are mostly fulfilled. Joint inspection of the unit was conducted to verify the recommendations made as well as the compliance status of the notice of direction issued by GPCB earlier.

C : Industrial Effluents in Bil Khadi Naturan Drain at Chharwada, Vapi, Gujarat

A complaint regarding flow of industrial effluent, having high COD and BOD, in the natural drain (Bil khadi) was made by the residents of Avenue Residency, located on the bank of Bil khadi at Chharwada, Vapi. The Bil Khadi passes through Industrial Area, Vapi and traverses behind their residential complex and further meets with River Kolak, which ultimately meets with the Arabian Sea. Due to effluent flow in Bil Khadi the complaint for odour pollution and groundwater pollution was made. The area was visited on 20.06.2012 and surface water (bil khadi) and groundwater monitoring were carried out. The following are the main observations:

- It was observed that considerable amount of effluent (industrial as well as domestic) was finding way into Bil khadi. The pond of effluent generated in the way of Bil khadi in the area surrounding St. Xavier School, K.R. Desai College, GETCO Office, Pumping Station-1 GIDC.
- The analysis results indicate that there is gradual decrease in the concentration of COD and BOD as the bill khadi traversed away from the industrial area. This may be due to dilution by confluence of domestic wastewater from the residential area. It was informed by complainants that the quality and quantity of wastewater flowing differs many times.

D: Problem of Kolsi (Charcoal Dust) at Dahej

M/s. Adani Petronet (Dahej) Port Pvt. Ltd., M/s Birla Copper and adjoining areas of village Lakhigam, near Dahej Port was visited with reference to complaint by Hon'ble Member of Parliament (Lok Sabha), Bharuch, Gujarat regarding problem of Kolsi (charcoal dust) in the area. The visit was carried out on 04.12.2012 and the main observations are:

- The coal dust emission problem arises during loading and unloading of trucks used for the transportation of coal from storage yard to silo located near to Lakhigam railway station for Wagon loading.
- Dust emissions were also observed during loading of wagons, coal was found stored in open near Lakhigam railway station.
- As informed, conveyor system is being arranged from storage yard to silo for transfer of coal and to avoid truck transportation. After these, the Wagon loading will be carried out through silo only and will result in the reduction of dust in the area. The work is estimated to be completed by January 2013 end. The construction work for conveyor system was found under progress.

E: M/s. Kutch Chemical Industries Limited, Padana Village, Dist. Kutch, Gujarat

M/s. Kutch Chemical Industries Limited, Padana Village, Taluka Gandhidham Dist. Kutch was visited with reference to complaint made by Environment Protection Society, Ahmedabad regarding water pollution caused by the industry. The visit was carried out on 13.07.2012 during which non-compliance with respect to acidic wastewater discharged outside the premises, unscientific incinerator, and improper wastewater management were observed. Detailed inspection cum monitoring report prepared and submitted.

F: Unauthorised use of Coal Gasifiers at Morbi and Wankaner Area, Rajkot, Gujarat

Ceramic (tiles manufacturing) industries in Morbi and Wankaner Area (District-Rajkot, Gujarat) were visited during 18-20.07.2012 to investigate the matter of unauthorized use of coal gasifiers and pollution with reference to representation made by Hon'ble Member of Parliament, Lok Sabha, Rajkot. There are about 479 ceramic industries in the area, out of which many of them using coal-gasifier. During this period, 13 units were visited randomly.

The ceramic industries in these areas started using coal gasifiers for the production of coal gas which is required for the Kiln in tiles manufacturing. The gas from coal gasifiers is cheaper than Pressurized Natural Gas (PNG) supplied by M/s. Gujarat State Petroleum Corporation (GSPC), and therefore many industries installed gasifiers even though GPCB has not authorized coal gas (from gasifier) as fuel in the Consolidated Consent & Authorization (CCA). It is informed that the use of coal gas reduces the kiln fuel cost to about half of that of PNG.

M/s. GSPC has laid PNG well-connected network in the entire Morbi and Wankaner Area. Some of the units were also using PNG as fuel in the kiln.

Based on the visits, direction under Section-5 of the Environment (Protection) Act, 1986 was issued to 09 units and direction under Section-18(1)(b) of the Water (Prevention & Control of Pollution) Act, 1974 and the Air (Prevention & Control of Pollution) Act, 1981 was issued to GPCB on 23.08.2012 for directing the industries in Morbi-Wankaner cluster using gasifier.

The area was again visited during 01-03.11.12 and 06-07.11.12 for the follow up of directions issued. Total 32 units were visited (09 units directed by CPCB and 23 other units). Thereafter, CPCB issued closure directions under Section- 5 of E (P) Act, 1986 to 07 units, directions to 10 units and show cause directions to 12 units. The visit to these industries in view of compliance verification is carried out from time to time.

G: M/s. Shree Renuka Sugars Limited, Bharapar, Gandhidham, Kutch, Gujarat

M/s. Shree Renuka Sugars Limited, village Bharapar, Tal. Gandhidham, Dist. Kutch, Gujarat, was visited jointly with GPCB on 18.04.2012 with reference to public complaint (VIP Reference) regarding water pollution. The main observations made during visit are:

- The unit laid down about 7 km long PVC pipeline in September, 2011 for the disposal of accumulated rain water/wastewater from main gate to natural drain/khadi i.e. Kidana khadi which ultimately meets with the Arabian Sea. No permission for laying of such pipeline was taken from GPCB.
- The unit has not complied with the EC and consent conditions in respect of water usage and discharge.

Based on this visit report, CPCB forwarded the observations to GPCB for action with request for joint re-inspection of the unit, during its operation. Accordingly, the joint inspection was carried out on 28.08.2012. It was observed during second visit that the unit has removed the pipeline for the disposal of wastewater to the natural drain/ khadi i.e. kidana khadi. The other non-compliance in respect of treated wastewater quality, wastewater treatment, EC conditions, CCA conditions still exists. Based on the observations, CPCB has issued show cause direction (dated 12.02.2013) to the unit under Section-5 of E (P) Act, 1986.

H: M/s. Gujarat Sidhee Cement Ltd, Sidheegram, Dist. Junagadh

M/s.Gujarat Sidhee Cement Ltd, Sidheegram, Dist Junagadh was visited during 22– 23.01.2013 with reference to complaint made by Hon'ble M.P. (Lok Sabha). The visit was jointly carried out along with Regional Office, GPCB, Junagadh. GPCB had earlier issued directions under Section-31 (A) of the Air (Prevention & Control of

Pollution) Act, 1981 to the unit and the unit had submitted time bound action plan to GPCB.

During the visit, source emission monitoring of all operational stacks was carried out. The compliance status of action plan submitted by the industry to GPCB was also verified. It was found that the concentration of Particulate Matter exceeds in the stacks attached to the raw mill/kiln and coal mill. The non-compliance of action points given in action plan was also observed. Based on the report, show cause direction (dated 10.04.2013) under Section-5 of the Environment (Protection) Act, 1986 was issued.

I: Discharge of Industrial Effluent in Rivulet Kotar at Tokharkhada, Rakholi, Silvassa

With reference to a complaint made by Social Activist, in the UT of Daman Diu and Dadra Nagar Haveli (DD & DNH) regarding pollution due to discharge of industrial effluent in the Rivulet "Kotar" at Tokharkhada, Silvassa, the area was visited and monitored Rivulet (Kotar) at Tokharkhada, Sayli, Rakholi, Silvassa and two industries (manufacturing major product-synthetic fibres- Partially Oriented Yarn (POY).

Detailed monitoring of rivulet along with complainant, and industrial monitoring of M/s Alok Ind. Ltd., M/s Bhilosa Ind. Pvt. Ltd. and Silvassa, Sayali & Rakholi Area for wastewater was carried out during 06.03.2013. It was observed that the domestic/ industrial discharges from Alok Industries Ltd. found its way into the natural drain/ rivulet causing pollution in the rivulet; treated effluent is not meeting with industry specific standards. In case of M/s. Bhilosa Industries Pvt. Ltd, effluent was found spread on the ground inside the premises and also it was not found meeting with standards.

Apart from this, regular follow-ups with reference to the general public complaints were also coordinated with concerned State Pollution Control Board for redressal. Total 36 no. of public complaints were addressed and forwarded to the State Board for appraisal on the action taken.

11.11.4 Court Cases Attended by Central Pollution Control Board Zonal Office-Vadodara

During the financial year 2012 – 2013, the Central Pollution Control Board Zonal Office Vadodara has addressed following Court cases :

Supreme Court Cases

Petition for Special Leave to Appeal (Civil) no. 16860/2012 (From the judgement and order dated 11/05/2012 in SCA No. 5986/2010 of the High Court of Gujarat at Ahmedabad)

The matter is between M/s. Electrotherm (India) Ltd. Petitioner(s) V/s Patel Vipulkumaar Ramjibhai & Ors. Respondent (s). Hon'ble Supreme Court of India, in its order dated May 11, 2012 directed CPCB to monitor and ensure the compliance of the statutory requirements to curb the menace of pollution, and file the status report by 2nd week of July, 2012. Accordingly, the industrial premises was inspected and monitored during 13.06.2012 to 15.06.2012. The outcome of the inspection was that the industry was non-compliant with pollution standards in one or the other area and half of the plant was not in operation during the inspection visit. The report was forwarded to CPCB HQs for submission to Hon'ble Supreme Court.

High Court Cases :

- **Special Civil Application No. 8406 of 2012**

The matter is between Shri Sureshbhai Keshavbhai Waghvankar & Others (petitioners) versus State of Gujarat & Others (respondents) where Central Pollution Control Board is respondent. The matter is regarding making and immersion of ganesh idol made up of plaster of paris (POP). Counter affidavit was filed in the Hon'ble High Court of Gujarat. The matter appeared twice in the Court. As per order dated 07.09.2012, the matter has been transferred to National Green Tribunal (NGT).

- **Writ Petition (PIL) No. 47 of 2012**

The matter is between Parth Mahila Utkarsh Mandal (NGO) through Mahamantri Shri Pravinbhai Vaghjibhai Kothiya (petitioner) versus M/s Sraddha Developers & others (respondents), where Union of India is impleaded as party respondent. The matter is regarding illegal constructions within the radius of 500 meters of Hazardous Waste Secured Landfill Site (TSDF) of M/s The Green Environment Services Co-operatives society ltd., Vinzol, Dist. Ahmedabad.

Though, CPCB is not respondent, after getting communication from Shri Anshin H. Desai, Senior Central Govt Counsel, High Court of Gujarat, Ahmedabad, Central Pollution Control Board has submitted comments in the matter to him.

- Cases in Central Tribunal Ahmedabad
- In the matter of Mr. Rupendra J. Barala Vs Union of India before vide no. OA/182/2012 before Ahmedabad bench of Hon'ble CAT.
- In the matter of Mr. Solanki Ramabhai D. & Ors. Vs CPCB vide no. OA/80/2013 with MA/109/13 before Ahmedabad bench of Hon'ble CAT.
- Court cases at CJM/JM, Silvasa, Dadar & Nagar Haveli
- Before the Chief Judicial Magistrate/Judicial Magistrate, Silvassa (criminal complaint no. 153 of 2009) against M/s Jakson & Company, Delhi (Diesel Generator Set manufacturing company),
- Before the Chief Judicial Magistrate/Judicial Magistrate, Daman (criminal complaint no. 90 of 2009) against M/s Ankitech Pvt Ltd (Diesel Generator Set

manufacturing company) as Criminal complaints under Section 15 & 16 Read with Section-19 (a) of the Environment (Protection) Act, 1986.

11.12 DIRECTIONS / VERIFICATION OF COMPLIANCE OF DIRECTIONS ISSUED UNDER SECTION 5 OF THE ENVIRONMENT (PROTECTION) ACT, 1986:

- Central Pollution Control Board is pursuing continuously for ensuring compliance to Directions issued under Section 5 of the Environment (Protection) Act, 1986 to the CBWTFs /HCFs. During the year 2012-2013, based on the observations made by the inspecting team, directions under section 5 of the E (P) Act, 1986 were issued to seven (7) nos. CBWTFs located in Haryana State.
- Based on the inspection and monitoring reports received from the respective Zonal Offices of Central Pollution Control Board, CPCB issued fifteen (15 nos.) Show Cause Directions & Fifteen (15 nos.) confirmed Directions under Section 5 of the Environment (Protection) Act, 1986 to the defaulter CBWTFs / HCFs for not complying with the provisions of Bio Medical Waste Rules and CPCB guidelines. The concerned CBWTFs have been directed to submit a time bound action plan along with a bank guarantee of Rs. Ten (10.00) lakhs in favour of CPCB, to ensure compliance of CPCB Directions.
- Upon receipt of the public complaint, the Common Bio-medical Waste Treatment Facilities located at Meerut & Roorkee, Uttar Pradesh were inspected and based on the inspection /observations, Directions under Section 5 of the Environment (Protection) Act, 1986 were issued to the Units.
- After ensuring compliance to the directions, directions issued under Section 5 of the Environment (Protection) Act, 1986 to 12 nos. of CBWTFs located in the States of Andhra Pradesh, Madhya Pradesh, Haryana, Punjab, Tamilnadu, Bihar, Gujarat have been revoked.

11.13 ASSESSMENT OF AIR QUALITY STATUS AT ENNORE PORT LIMITED, CHENNAI

Ennore Port was originally conceived as a satellite port to the Chennai Port, primarily to handle thermal coal to meet the requirement of Tamil Nadu Electricity Board (TNEB) and was endowed with large chunks of land (about 2,000 acres). The scope was expanded taking into account subsequent developments such as to set up a 1,880 MW LNG power project in association with a private consortium, a large petrochemical park and naphtha cracker plant. Commercial operations commenced with Handymax geared vessels for unloading of thermal coal on June 22, 2001. With the deployment of self-unloading and gearless vessels of 65,000/77,000 dead weight tonnage (DWT), full-fledged operations were started in December 2002. Currently Ennore Port is operating with two coal berths catering to thermal coal requirements of North Chennai Thermal Power Station (NCTPS), Mettur and Ennore Thermal Plants of TNEB. The Port is expanding in a major way by developing mainly through private sector on BOT basis. To assess environmental issues following studies has been undertaken as follow-up of Court directions.

Ambient air quality monitoring at Ennore port

The 24 hourly monitoring was carried out for six days during May 14 -20, 2012 at four locations.

The concentration of PM10 measured manually at all the four locations in and around Ennore port during May 14 -20, 2012 were found within the air quality standard limit of 100 µg/m3 whereas the same for PM2.5 were also observed within the limit of 60 µg/m3 except two days at Main security gate and one day at SICAL Iron Ore Security Gate.

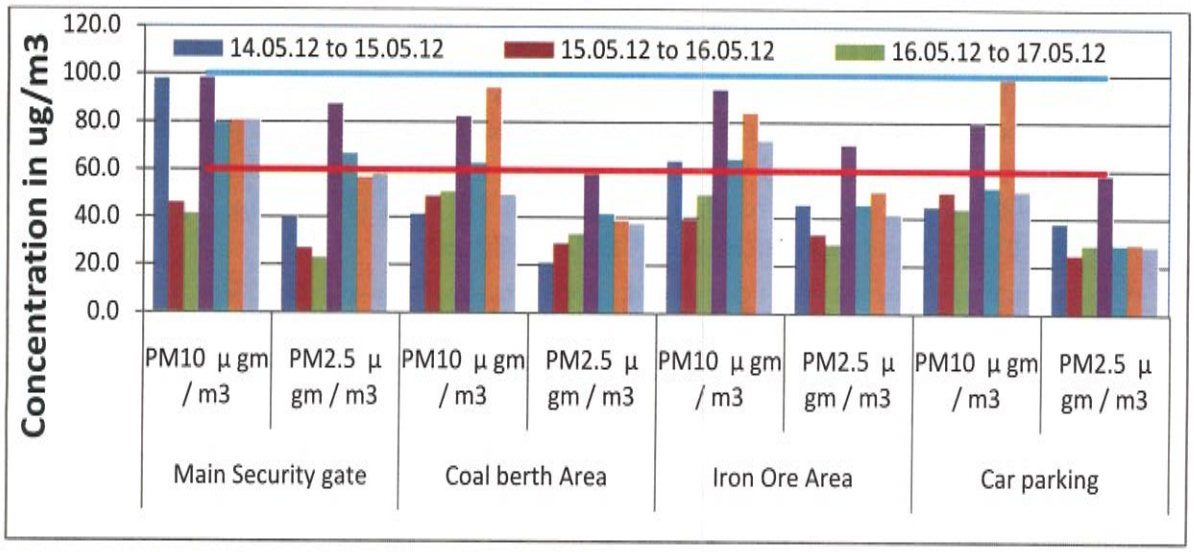


Figure 11.1: 24 Hrly ambient air quality status in and around Ennore port monitored during May 14 -20, 2012 (Manual monitoring)

Continuous online monitoring

Out of four locations monitored for PM10 and PM2.5, the concentration of PM10 at all locations and days were found within the standard limit except two days at main security gate and one day at iron ore area for PM2.5 which was found exceeding against the prescribed limit of 60 µg/m3. Out of six days monitored at three locations, the concentrations was found exceeding three days while compared with National Air Quality Standard for PM10. The gaseous parameters were found well within the standard limits at all locations.

OBSERVATION WITH RESPECT TO TERMS OF REFERENCE OF THE HON'BLE SUPREME COURT

The Hon'ble Supreme Court has sought for a comprehensive report from the above empowered Committee on the following points:

Point No.1: The impact and extent of pollution to the environment due to the handling of the cargo in question, namely, dusty coal and iron ore at the Chennai Port.

Based on the archived air quality data (2009-2012) measured inside the Chennai port, the particulate matter (PM10) concentrations were found exceeding the National Ambient Air quality standard limit of 100 μg/m3 with 69, 84, 100 & 49 % of times monitored during the year 2009, 2010, 2011 and 2012 respectively.

It may be noted that there was an increasing trend of the violations from the year 2009 to 2011 until the coal and ore handling was in operation and thereafter (October 2011 onwards) there was a declining trend of violations.

The present monitoring carried out during 14-26 May 2012 by the Technical Sub-committee also indicates that the 24-hours mean as well as median values of PM10 concentrations were exceeding the NAAQ standard values (PM10 – 100 μg/m3) at all 06 locations inside the Chennai Port. Further, it was observed that PM2.5 concentrations were also exceeded at four locations. It may be inferred that PM10 and PM2.5 concentrations were found exceeding the standard limit even after coal and ore handling were stopped during October 2011.

Point No.2: Suggestions regarding remedial / mitigative measures, which may be adopted at the Chennai Port to remedy / reduce the pollution, if any, caused by the handling of dusty cargo in question.

The Technical Sub-committee suggested certain remedial / mitigative measures which may be adopted at Chennai port after detailed deliberations, literature survey and interaction with expert's related organizations.

Point No.3 : Assessment of the standard of facilities available at the Ennore Port to handle dusty coal and iron ore cargo.

The Technical Sub-committee visited and assessed the infrastructure facilities available with the Ennore port to handle coal and ore. The adopted modern equipments and machineries are ship unloader, Mobile wagon and truck loading system, Surge Hoppers & feeders, closed conveyer system, stacker cum reclaimer, Wind shield dust production wall, adequate sprinklers and cannons, and isolated wide area for stacking coal and ore etc. The details of Infrastructure Facilities and Air Quality Status at Ennore Port Limited, Chennai have been submitted.

CHAPTER XII

FINANCE AND ACCOUNT

CENTRAL POLLUTION CONTROL BOARD, DELHI

RECEIPTS & PAYMENT ACCOUNT FOR THE YEAR ENDED 31.03.2013

(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)	365,205,766	338,388,037
b) Bank Balances	-		b) Administrative Expenses (corresponding to schedule 21 and 24)	141,684,872	251,613,127
i) In current accounts	365,371,802	242,068,934	c) Prior Period Exps	45,714,598	
ii) In deposit accounts	89,294,474	9,080,000	II. Payments made against funds for various projects	-	
iii) Savings accounts	-	-	Project Exps	59,863,294	19,879,408
II. Grants Received	-			-	
a) From Government of India - Mains	464,880,000	620,000,000	III. Investments and deposits made		
b) From State Government	-	-	a) Out of Earmarked/Endowment funds	-	-
c) From Government of India - Projects	603,307,880	286,258,630	b) Out of Own Funds (Investments-Others)	-	-
d) Others	1,000,000				
			IV. Expenditure on Fixed Assets &Capital Work in progress		
			a) Purchase of Fixed Assets-Own fund	40,903,216	31,586,042
III. Income on Investments from			b) Purchase of Fixed Assets- Earmarked/Endowment funds	-	-
a) Earmarked/Endow. Funds	9,758,910	7,147,979			
b) Own Funds	-	-	V. Refund of surplus money/Loans		
			a) To the Government of India	116,492,708	-
IV. Interest Received	-	-	b) To the State Government	-	-
a) On Bank deposits	2,544,977	4,025,215	c) To other providers of funds	-	-
b) Loans. Advances etc.	196,608	205,402			
			VI. Finance Charges (Interest & Bank charges Sch 23)	17,822	42,980
V. Other Income (Specify)					
a) Income from Royalty, Publications Etc.	658,140	827,341	VII. Other Payments (Specify)		
b) Other Income	2,380,077	3,451,988	a) Advances and other payments (Net) - Mains	-	-
c) Misc Income	-	2,760	b) Advances and other payments (Net) - Projects	29,679,488	103,136,780
VI. Amount Borrowed	-	-			
			VIII. Closing Balances		
VII. Any other receipts			a) Cash in hand	(219)	(219)
a) Other - Mains	60,596,455	(1,007,314)	b) Bank Balances	-	-
c) Sale of Fixed Assets	3,316	1,470,673	i) In current accounts	335,833,683	365,371,802
d)Advances and other payments (Net)-Mains	20,254,780	25,781,041	ii) In deposit accounts	13,306,559	89,294,474
			iii) In Savings account	471,543,234	-

Grand Total	1,620,245,000	1,199,312,430	Grand Total	1,620,245,000	1,199,312,430

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

(C.P. Mishra)
M.NO. 073009
Partner
Place: Delhi
Date: 21.01.2014

K.M. AGARWAL & CO. 38, METAL SUBHASH MARG, DARYA GANJ, NEW DELHI 110002 CHARTERED ACCOUNTANTS

For Central Pollution Control Board

(Susheel Kumar)
Chairman

(A.B. Akolkar)
Member Secretary

(M.S.Bansal)
Accounts Officer

(Mohan Kapur)
Assistant Accounts Officer

Chapter XIII

ANNUAL ACTION PLAN FOR THE YEAR 2013-14

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.

The Annual Action Plan (Work Plan) of CPCB for 2013-14 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 will be given on strengthening of existing Zonal Offices and opening of two new Zonal Offices, i.e. one at Chennai and another at Chandigarh.

13.1 SALIENT ACHIEVEMENTS OF THE YEAR 2012-13

13.1.1 Assessment of Pollution:

- Installed ten (10) real-time water quality monitoring stations (RTWQMS) on river Ganga and Yamuna.
- Carried out water quality monitoring at 2500 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 545 stations covering 225 cities/towns in 26 States & 5 Union Territories.
- Operation & Maintenance of 35 National Ambient Noise Monitoring Network (NANMN) stations located in 07 cities (Delhi, Mumbai, Hyderabad, Lucknow, Kolkata, Bangaluru, Chennai).
- Operating 15 CAAQMS in 4 cities, 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 on CPCB's website on regular basis.
- Ambient Dioxin/Furan monitoring has been undertaken during Pre-Deepawali, Deepawali & Post-Deepawali at two locations in Delhi.
- Prepared status report of water quality in India-2011.

- Carried pre-monsoon and post-monsoon monitoring and sampling of 93 ground water and surface water in NCR of Delhi.

13.1.2 Industrial Pollution Control:

- Emission standards have been developed for cement industry (NO_x & SO_2 and load-based for particulate matter), emission standard for petrol and kerosene DG sets, emission standard for DG sets (upto 800 KW) and effluent & emission standards for Dye and Dye intermediate industry. (These standards have been forwarded to MoEF for Notification).
- Emission standard for CNG/LPG based Genset upto 400 cc and upto 800 Kw capacity developed. (This standard has been approved in Board Meeting held on 22nd March, 2013) .

13.1.3 Waste Management:

- Trial run for disposal of union carbide waste is under progress at Pithampur (MP).
- CPCB is preparing Guidelines for management and handling of Phosphorus waste.
- The study of Life Cycle Assessment of plastic products completed and report prepared.
- Carried out inspections of TSDFs, CBMWTFs and SLF.
- Completed study on quantification and characterization of plastic waste in 60 major cities in India. Report finalised.
- Provided and presented the status report on implementation of PWM Rules, 2011 to Hon'ble Supreme Court in SLP (C) 16308/2007.
- The report on performance study of Plasma Pyrolysis Technology for disposal of plastic waste is under printing.

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.
- Published twenty (15) technical and scientific reports and mass awareness material for distribution during Kumbh Mela, 2013 held at Allahabad.
- Conducted 19 national training programmes on various environmental pollution and prevention areas. These programmes were attended by staff of CPCB and SPCBs.

13.2 THRUST AREAS FOR YEAR 2013-14

The financial year i.e. 2013-14 is the 2nd year of 12th Five Year Plan (FYP). An Expenditure Finance Committee Memo of CPCB for 12th FYP has been submitted to MoEF detailing year-wise activities. During year 2013-14, few new activities will be undertaken, however, the schemes/activities started during year 2012-13 will be completed during year 2013-14. The emphasis will be provided on the following projects/schemes under plan funds during year 2013-14:-

13.3 PROJECTS/SCHEMES PROPOSED UNDER PLAN FUND:

- Water quality monitoring will be carried out at 2500 stations;
- Intensive monitoring of 150 polluted river stretches and continuing inter-state water quality monitoring of rivers at 86 locations in 16 States;
- Undertaking toxicity evaluation in the relevant critically polluted areas out of the 43 identified critically polluted industrial clusters;
- Ambient air quality will be carried out at 650 locations.
- Setting up of 35 noise monitoring stations in metros and in State capitals.
- Central laboratories at Head Quarter and four zonal laboratories will be strengthened to have National Accreditation Board for Testing and Calibration Laboratory (NABL) accreditation, certification under OHSAS 18001 and recognition as Environmental Laboratories under the Environment Protection Act.
- Laboratories will be equipped to analyse 48 parameters relating to liquid effluents, and 40 parameters with respect to gaseous emissions and ambient air.
- Standard development will consider best available cleaner technological options and be in line with National Environment Policy (NEP-2006). Standards will also be evolved for waste recycling industries and such wastes shall include; Hazardous waste, E-waste, waste Batteries and others.
- Monitoring of 43 critically polluted industrial clusters as well as taking stock of situation on implementation of action plans by the state agencies. CPCB will also interact with SPCBs and PCCs for carrying out health-based surveys in the critically polluted areas involving third party agency for monitoring through contribution from industries on polluter pays principle.
- Formulation of proposals for adoption of cleaner production technologies and technologies aiming for zero waste (Zero Liquid Discharge) and pollutant removal.
- Emerging and dynamic environmental challenges have widened the scope of training areas which would cover issues relating to; climate change, waste recycling/re-use, standards and assimilative capacities of recipient environment, new production technologies, clean and green technologies, Innovative Technologies in waste management, health-based standards and others.
- Organizing mass awareness will be the continued/on-going activity.
- Emphasis will be laid on inventorisation of wastes including their quantification characterization (hazardous waste, bio-medical, plastics, electronic, batteries, and municipal solid wastes)
- To reduce the gap between waste generation and treatment, CPCB with MoEF and other stakeholders, will assess the requirement of common waste management facilities.

- Remediation and mitigation plans for contaminated hazardous waste sites and rehabilitation of existing MSW dumpsites will be executed through Ministry of Urban Development and urban local bodies.
- Total recycling/ re-use of waste will be enforced and will include harnessing energy recovery from high calorific value waste in cement kiln and of Steel mills/ Power Plants furnaces.

13.4 SPONSORED PROJECTS

A Projects Sanctioned Under Cess Fund (By MoEF)

1. Establishing Continuous Ambient Air Quality Monitoring Stations (CAAQMS) in Critically Polluted Areas.
2. Expanding National Ambient Noise Monitoring Network from 35 to 70 stations in 2012-13.
3. Establishing Real- time water quality monitoring stations (RTWQMS) on river Ganga.
4. Co-processing of hazardous and other wastes in cement plants, iron and steel industries and power plants.

B Projects under NGRBA

1. Implementation of schemes/activities under NGRBA programme.
2. Elimination of Escherichia coli and other fecal coliform bacteria through bacteriophages from river Ganga and tributaries under NGRBA
3. In-situ bioremediation for sewage treatment (Budha Nala, Ludhiana)

13.5 BUDGET ALLOCATION FOR YEAR 2013-14

Project Head-wise Budget Allocation for the year 2013-14 is summarized as under:

Project Heads No.	Project Head	Total Allocation (₹ in Crores)	1st installment (₹ in Crores)
I	Pollution Assessment (Survey and Monitoring)	22.00	5.50
II	Scientific and Technical Activities and R&D	5.00	1.25
III	Industrial Pollution Control (standards, enforcements and technologies):		
	a) Standard Development	5.00	1.25
	b) Enforcement	16.00	4.00
	c) Technology	1.00	0.25
IV	Training and Awareness:		
	a) Training Programmes	1.00	0.25
	b) PR, Mass Awareness Programmes & Hindi	1.00	0.25
	c) Library	0.50	0.125
V	Information (Database) Management	1.00	0.25
VI	Waste Management and Urban Pollution Control (Plastic Waste, Hazardous Waste, Municipal Solid Waste, Bio-medical waste, E-waste & Vehicular Pollution)	5.22	1.305
	Total	**57.72**	**14.430**

CHAPTER XIV

OTHER IMPORTANT ACTIVITIES DEALT BY CENTRAL BOARD

14.1 INSPECTION AND MONITORING OF SEWAGE TREATMENT PLANTS (STPs)

During the year 2012-13, inspection and monitoring studies of Sewage Treatment Plants located in various states were carried out to assess the performance status.

14.1.1 Sewage Treatment Plants - Central Zone

Central Pollution Control Board Zonal Office, Bhopal has carried out Performance study at Kabit Khedi, Indore, MP. PHED has constructed two STP's of 78 MLD capacity and 12 MLD based on UASB technology at Khabit Khedi in Indore for sewage treatment of Indore city under NRCP. The samples were analyzed in the Laboratory. The performance of STP in terms of COD and BOD removal was found to be 78% and 77% at 78 MLD sewage treatment plant and 72% and 69% at 12 MLD sewage treatment plant respectively.

14.1.2 Sewage Treatment Plants in Agra- Mathura Region:

(A) STPs located at Agra:

Agra has generation of about 260 MLD sewage with a capacity to treat only 116 MLD sewage and rest is being discharged into river Yamuna without treatment. Yamuna Pollution Control Unit, UP Jal Nigam, Agra has installed five sewage treatment plants of total capacity of 116.25 MLD ((i) Devri Road- 12 MLD, (ii) Dhandupura-78 MLD, (iii) Pilakhar-10 MLD, (iv) Buri ka nagla-2.25 MLD and (v) Jaganpur 14 MLD) in different phases by tapping various drains falling directly into river Yamuna presently three more STPs viz. Dhandhupura Part-II (24 MLD), Bichpuri 40 (MLD) and Bichpuri –II 36 (MLD) are under construction. The completion of these STP will raise total sewage treatment capacity to 226.25 MLD.

(B) STPs located at Mathura:

Mathura is the famous religious place in the country and is well known as the birth place of Lord Krishna. It is located on the bank of River Yamuna. The total sewage generation of the city is approx. 60 MLD out of which, 27 MLD of sewage is treated in two STPs located at Masani Nalla (12.5 MLD) and Laxmi Nagar (14.5 MLD) and the remaining is discharged into Yamuna River through various drains. Another sewage treatment plant (16 MLD) capacity is under construction in Mathura.

(C) STPs located at Vrindavan:

Vrindavan is a famous religious place of the country situated on the bank of River

Yamuna has sewage generation of approx 12 MLD. This city has two Sewage Treatment Plants, one Kalideh STP with a capacity 0.5 MLD and another Pagla Baba STP with capacity of 4.0 MLD. Out of 12 MLD sewage generated in the city, only 4.5 MLD of sewage is treated at STPs and remaining untreated sewage is discharged into Yamuna River through various drains. Another 8 MLD sewage treatment plant is under construction at Vrindavan.

14.2 INSPECTION AND MONITORING OF COMMON EFFLUENT TREATMENT PLANTS

14.2.1 Common Effluent Treatment Plants (CETPs) at Jodhpur

Jodhpur Pradushan Niwaran Trust established a CETP of 20 MLD (i.e. 5 MLD Acidic and 15 MLD Alkaline Effluent) capacity at Sangaria Industrial Area, Jodhpur to treat the wastewater of textile units and steel re-rolling mills. Acidic wastes of steel industries are being collected through underground pipeline whereas alkaline wastes of textile units through RIICO open drain. The unit has separate collection cum equalization tanks followed by common flash mixer and clari-flocculator, sludge decanters, secondary clarifier, sand bed and ACF for both acidic and alkaline effluents. Approximately 15MLD alkaline waste water generated from textile mills and 1.5 MLD acidic waste water generated from steel mills. 109 rolling mills, 215 textile units and 10 dye & dyes intermediate units are the members of CETP. The management has laid down separate pipe lines for acidic effluent and alkaline waste water. Still several industries have not joined CETP and discharging directly into common drain making the waste water acidic. The final treated effluent, after mixing with untreated effluent joins River Jojri near Salawas at about five Km distance from CETP. The CETP was monitored by Central Pollution Control Board, Zonal Office Bhopal on 8.8.2012. Samples from CETP inlet and final outlet were also collected for analysis and results are presented in table 14.1 :

Table 14.1 Analysis results of CETP, Jodhpur.

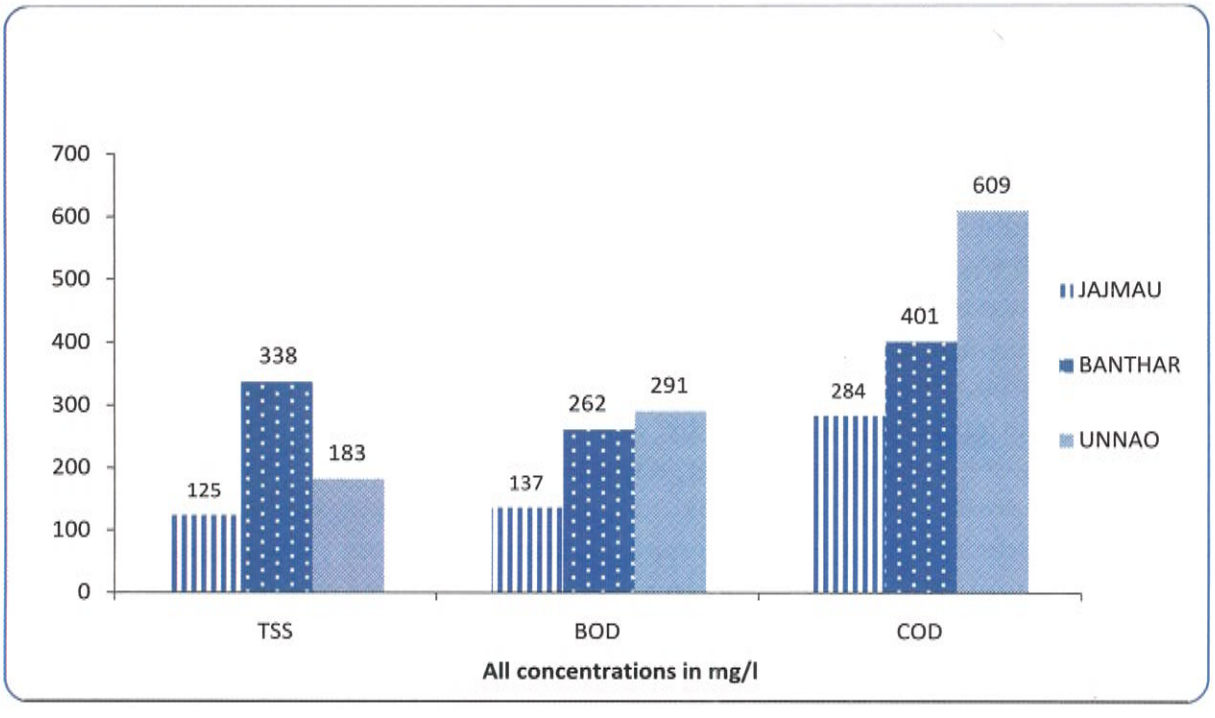
S. No.	Location	pH	TSS	COD	BOD	Cl	SO_4	O&G
1.	CETP inlet	6.61	3704	735	135	789	932	--
2.	Final outlet	7.10	116	288	91	646	902	12
Standard prescribed by RSPCB		6.5 to 8.5	100	250	30	--	--	10

All values are in mg/l except pH.

On the basis of the monitoring report, direction under section 18(1)(b) of the Water Act 1974 has been issued to RSPCB for necessary imrpvement at CETP, Jodhpur.

14.2.2 Common Effluent Treatment Plants (CETPs) at Kanpur, Unnao and Banthar (Unnao)

Monitoring of CETPs operational at Kanpur, Unnao and Banthar (Unnao) was carried out by Central Pollution Control Board, Zonal Office Lucknow during the year. Salient observations are as below:



(A) CETP at Jajmau, Kanpur, Uttar Pradesh

- CETP is based on Up-flow Anaerobic Sludge Blanket System (UASB)
- CETP is getting higher concentration of the different pollutants at its inlet than designed capacity, which makes the CETP ineffective to treat the wastewater generated by the industrial area. Proper collection system not yet laid down in the industrial area to collect wastewater generated for treatment.
- Dried sludge evacuated from the sludge drying beds found indiscriminately dumped on the low-lying area nearby the CETP.
- Pumping of the effluent from different pumping stations should be synchronized to get optimum use of CETP.
- Laboratory within the premises of the CETP should be operational and regular chemical analysis of the samples should be carried out to have better control over the process of treatment.

(B) Common Chrome Recovery Plant, Jajmau, Kanpur, Uttar Pradesh

- The plant is underutilized, for want of spent chrome liquor from member tanneries and concomitant withdrawal of recovered chrome liquor in tanning operations.

- Overall treatment & recovery economics of the plant is adversely affected due to lack of co-ordination among tanners, municipal corporation and plant management. There is a need and strict enforcement of a tripartite agreement among the three key stakeholders to ensure regular operation of the plant.

(C) CETP Site-II, Industrial Area Unnao, Uttar Pradesh

- The CETP is based on Activated Sludge Process.
- MG filter and Activated carbon filter are provided after the tertiary clarifier to remove the fine sand and colour of the treated waste respectively.
- Water flow meter installed at the final outlet of the CETP.
- Unit has developed integrated phytoremediation system for removal of chromium from chromium contaminated waste.
- Bar screens are installed to remove floating and suspended particles.
- Unit has 28 Nos. of Sludge drying beds which have been found maintained.
- Dry sludge is disposed to the captive TSDF at Banthar, Unnao.

(D) CETP, Leather Technology Park, Banthar, Unnao, Uttar Pradesh

- The CETP is based on Activated Sludge Process.
- During the inspection 3 out of 9 of aerators in primary aeration tank were found non operational.
- Unit has installed MG filter and Activated carbon filter after the tertiary clarifier to remove fine sand and colour of the treated waste water respectively.
- Unit has 34 nos. of Sludge drying beds which are maintained adequately.
- Water flow meter and V-notch have been installed at the final outlet of the CETP.
- High concentration of Chromium (30.8 mg/l) in raw effluent indicate ineffective chrome recovery through primary treatment by member units of CETP.
- High TDS (10911 mg/l) in treated effluent indicate improper waste management practices by individual member units.

14.2.3 Common Effluent Treatment Plants (CETPs) at Karnataka:

Performance evaluations of three CETPs were carried out at Kadugondanahalli, Bengaluru, KIADB Industrial Area, Doddaballapur and Kunigal Industrial Area, Kunigal, Karnataka. The salient observations and monitoring results of these CETP's are as follows:

1. Out of three CETP's, two CETP's are working in the range of 70-80% of its designed capacity and one CETP was working at 20 % of its designed capacity.
2. All CETP's are having chemical treatment followed by biological treatment system.

3. At two CETPs the treated effluent being utilised for gardening and plantation in their own land and selling to neighbours for gardening purpose. In other CETP the treated effluent being discharges into sewer line for further treatment at STP.
4. The sludge generated from the CETP's is being sent to TSDF.
5. No CETP's are having laboratory nor maintaining records of effluent quality received from member units.

Figure 14.2 Chemical, Biological treatment System and treated effluent being discharged into sewer line and utilized for gardening

Table 14.2 Analysis results of CETP's Monitored in Karnataka

S. No.	Parameter	CETP Kadu-gondanahalli, Bengaluru		KIADB Industrial Area, Doddaballapur			CETP, Kunigal Industrial Area, Kunigal, Karnataka				
							Low TDS effluent			High TDS effluent	
		Raw effluent	Final treated	Low TDS effluent	High TDS effluent	Final treated	Raw effluent (CIPSA)	Raw effluent	Final treated	Raw effluent	Final treated
1	pH	6.9	6.6	3.3	3.3	8.4	4.8	4.3	8.6	5.4	7.9
2	EC (µS/cm)	2030	1713	-	-	-	-	-	-	-	-
3	TSS (mg/l)	76	32	-	556	15	2416	1800	17.3	1580	08
4	TDS (mg/l)	1082	880	-	15060	2130.7	77036	44284	1922	24698	27.8
5	BOD (mg/l)	363	13	1035	-	26	14340	-	BDL	-	05
6	COD (mg/l)	1191	123	404.8	357.2	47.6	474224	109528	99.2	24698	27.8
7	Ammonical Nitrogen (mg/l)	58.8	53.2	12.5	13	9.5	11.8	-	-	-	-
8	Hexavalent chromium (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.172	BDL	BDL
9	Copper (mg/l)	BDL	0.08	3.46	5.43	0.042	0.54	0.05	0.09	0.24	0.11
10	Cadmium (mg/l)	0.03	BDL	BDL	BDL	BDL	1.51	0.18	0.02	0.07	0.04
11	Chromium (mg/l)	BDL	BDL	144	1253	BDL	1.69	1.73	0.50	0.70	BDL
12	Iron (mg/l)	9.48	11.9	6.00	346	BDL	31.30	23.90	1.95	21.50	3.19
13	Manganese (mg/l)	2.40	0.338	14.40	19.50	0.492	2.93	2.66	0.19	1.49	0.13
14	Nickel (mg/l)	BDL	BDL	2.18	271	1.59	1.14	1.20	0.64	0.54	BDL
15	Lead (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
16	Zinc (mg/l)	0.65	1.5	BDL	BDL	0.544	2.40	2.93	0.12	1.01	0.16

14.2.4 Common Effluent Treatment Plants (CETPs) at Tamilnadu:

In-depth study/monitoring of CETP at Walajapet, and CETP at Thuthipet, Ambur was carried out during the period as a follow up of direction under Section 5 of E(P) Act, 1986. Salient observations are presented below:

- In compliance to the direction from Central Pollution Control Board, the two CETPs have stopped discharging treated effluent into the drain.
- CETP at Walajapet has Tertiary treatment system comprising of the softener to reduce hardness, Ultra Filtration (UF) system followed by RO, MEE and ATFD to achieve zero liquid discharge. About 15-18 TPD salt is generated from the process.. The RO permeate and MEE condensate being sent back to member units through closed conduits.
- CETP at Thuthipet is operating at about 50% capacity. The unit has installed RO followed by MEE and ATFD to achieve zero discharge and generating salt about 1.0 tons/day. The unit has taken steps to modify the existing MBR into SBR and installation of softener and Ultra filtration are under progress.
- Both CETP's have developed Secured Landfills to dispose Hazardous waste generated from their member units as well as to dispose sludge generated from CETP's.

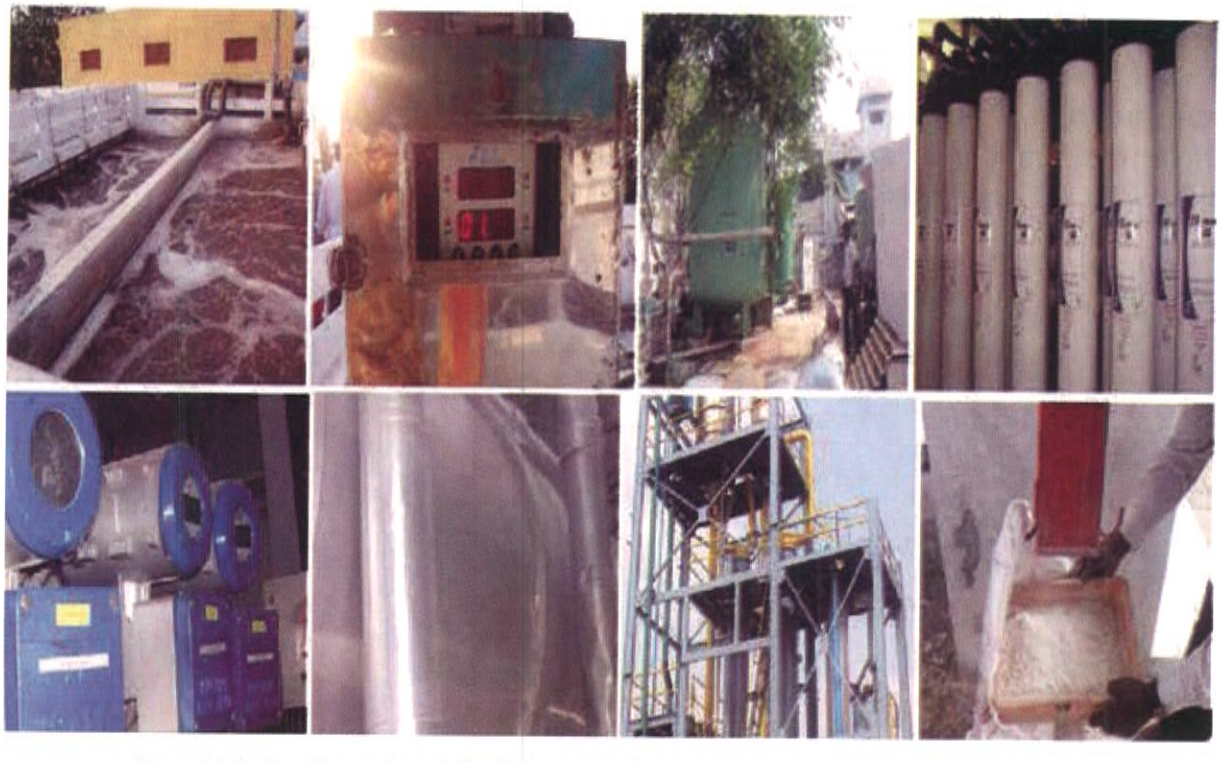


Figure 14.3 : Aeration system, Online DO meter, Softener, Ultra filtration system, RO System, MEE, Crystallizer and recovered Salt

Table 14.3: Performance of CETP's at Tamil Nadu

S. No.	Parameter	CETP at Thuthipet		CETP at Walajapet	
		Raw effluent	Final treated	Raw effluent	Final treated
1	pH	7.0	6.3	7.8	7.8
2	EC (μS/cm^2	25300	1230	18800	550
3	TSS (mg/l)	1910	-	852	03
4	TDS (mg/l)	16290	658	10898	352
5	BOD (mg/l)	3202	-	1954	-
6	COD (mg/l)	6280	04	2608	12
7	Hexavalent chromium (mg/l)	0.2	-	-	-
8	Sulphide (mg/l)	11.8	-	220	-

14.2.5 Common Effluent Treatment Plants (CETPs) at Gujarat & Maharashtra

There are 26 Nos. of CETPs operational in Gujarat while 28 Nos. of CETPs operational at Maharashtra. The CETPs are located in various industrial estates for the treatment of the liquid effluent generated from different industrial sectors. In order to assess the quality of treatment, the Central Pollution Control Board, Zonal Office Vadodara has taken up the study on the performance evaluation of selected CETPs located at Gujarat and Maharashtra. The monitoring was carried out for CETPs located at Vapi, Surat, Panoli, Ankleshwar, Ahmedabad in Gujarat and CETPs located at Tarapur, Ambernath, Dombivilli, Lote-Parshuram in Maharashtra. The CETPs located in GIDC Ankleshwar, GIDC Panoli, GIDC Vapi and Final Effluent Treatment Plant (FETP) at Ankleshwar are regularly monitored on quarterly basis. The performance of CETPs were not found satisfactory. The discharge norms are not being complied, though there was slight improvement than previous year. The monitoring results of CETPs and FETP are presented in Table 14.4 to 14.12 :

Table 14.4: Performance of CETP at PANOLI in Gujarat

Location	Monitoring Date	Parameters								
		pH	TSS	TDS	COD	BOD	NH3-N	CN-	Phenols	O&G
Inlet	08.08.12	6.56	425	23179	2295	308	73.5	0.99	13.47	--
Outlet		7.25	228	11889	851	39	79.5	0.23	0.50	23.5
Inlet	06.12.12	6.75	342	25495	2557	567	108.1	--	--	--
Outlet		7.45	149	15130	612	26	59.8	0.43	0.29	6.5
Inlet	27.02.13	7.37	537	32865	1890	257	97.7	--	5.82	--
Outlet		7.57	103	15666	605	62	93.0	0.36	0.43	10.0
GPCB Discharge Norms		5.5-8.5	100	2100	100	30	50	0.2	1.0	10

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

Considerable reduction in concentration of pollutants at final outlet was mostly due to dilution and not due to treatment to the extent, as observed from TDS concentration. The treatment units available at CETP consists of Equalization, Primary Clarification, Activated Sludge Process, Sand and Carbon Filtration.

Table 14.5: Performance of CETP at Ankleshwar, Gujarat

Location	Monitoring Date	Parameters								
		pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
Inlet	29.05.2012	3.23	2572	39956	5665	793	158.7	--	33.89	--
Outlet		6.38	36	10631	989	131	55.7	1.22	0.51	2.3
Inlet	08.08.2012	1.23	4691	40595	6293	945	119	1.05	108.45	--
Outlet		5.50	147	12020	642	40	119	0.19	1.63	1.5
Inlet	06.12.2012	2.07	1573	31983	6392	969	96.2	--	--	--
Outlet		6.82	34	16943	801	65	38.9	0.59	0.27	2.2
Inlet	27.02.2013	1.68	421	8048	4109	1153	75.60	--	67.0	--
Outlet		7.70	164	14077	588	48	29.4	0.70	0.62	8.7
GPCB Discharge Norms		**5.5-8.5**	**100**	**2100**	**100**	**30**	**50**	**0.2**	**1.0**	**10**

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

Table 14.6: Performance of CETP at Vapi, Gujarat

Location	Monitoring Date	Parameters								
		pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
Inlet	21.06.12	6.55	336	8039	1631	232	99.1	1.11	1.44	43
Outlet		6.56	84	8020	521	64	49.2	0.36	1.372	27.0
Inlet	05.09.12	7.14	392	4385	812	205	8.9	0.49	2.04	18.4
Outlet		7.22	212	2531	281	75	7.0	BDL	1.16	11.0
Inlet	06.12.12	7.17	428	7598	1141	394	61.3	--	--	--
Outlet		7.19	194	8472	531	87	33.3	0.45	1.54	9.2
Inlet	26.02.13	7.90	1400	8044	1550	354	33	--	2.65	--
Outlet		7.85	177	10001	617	58	70.6	0.45	1.42	27.0
GPCB Discharge Norms		**5.5-8.5**	**100**	**2100**	**250**	**30**	**50**	**0.2**	**1.0**	**10**

Note: All parameters except pH are expressed in mg/l BDL = Below Detection Limit.

Table 14.7: Performance of CETPs at Naroda Enviro Project Ltd., GIDC, NARODA, Ahmedabad, Gujarat

Location	Monitoring Date	Parameters								
		pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
Inlet	18.04.12	7.37	224	14610	4284	757	106	--	16.29	--
Outlet		7.83	134	13421	1846	167	120	0.24	7.98	23.1
Inlet	13.12.12	7.71	1302	28576	5724	2317	322	--	--	--
Outlet		7.70	567	21828	3429	962	166	0.01	BDL	33.8

Note: All parameters except pH are expressed in mg/l BDL = Below Detection Limit.

Table 14.8: Performance of CETP at GIDC, Odhav, Ahmedabad, Gujarat

Location	Monitoring Date	Parameters								
		pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
Inlet	18.04.2012	7.56	1362	8028	1804	399	55.3	--	6.31	--
Outlet		7.91	84	10338	490	45	90.9	0.35	1.23	1.8
Inlet	13.12.2012	7.15	169	6247	1915	519	65.6	--	--	--
Outlet		7.26	88	7980	352	39	13.2	0.104	0.12	0.82

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

Table 14.9: Performance of CETP at GIDC, Odhav, Ahmedabad, Gujarat

Location	Date Monitoring	Parameters								
		pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
Inlet	18.04.2012	5.56	3169	8952	3024	1112	405	--	0.09	--
Outlet		7.94	328	3179	1880	686	593.7	0.29	0.02	13.7

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

Table 14.10: Performance of CETP at Nandesari, Vadodara, Gujarat

Monitoring Date	Sampling Location	PARAMETER(S)								
		pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
24.09.2012	Inlet	8.29	298	24692	1860	546	72.8	--	0.23	--
	Final outlet	8.57	321	3820	236	10	11.5	0.21	1.47	1.3

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

Table 14.11: Performance of CETP at Padra, Vadodara, Gujarat

Location	Monitoring Date	Parameters								
		pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
Inlet	24.09.2012	7.97	817	15861	1243	236	17.4	--	0.64	--
Outlet		8.11	89	14070	411	36	12	0.16	14.01	1.8

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

Table 14.12: Performance of CETP at Vatva GIDC phase-II, Ahmedabad, Gujarat

Location	Monitoring Date	Parameters								
		pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
Inlet	18.04.2012	7.55	522	12515	1940	563	85.3	--	5.49	--
Outlet		7.69	101	10654	680	--	12.1	0.35	0.02	3.2
Inlet	13.12.2012	7.73	666	10285	7526	1277	66	--	--	--
Outlet		6.98	549	15502	1170	102	7.2	0.02	0.43	6.8

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

Table 14.13: Performance of CETPs at Lote Parashuram, Maharashtra

Location	Monitoring Date	Parameters								
		pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
Inlet	12.09.2012	8.13	199	2590	1203	276	252	--	1.81	--
Outlet		7.04	98	1936	329	56	97.1	0.104	0.25	0.72
Inlet(Grab)	16.10.2012	7.94	516	12244	1705	235	2639	--	0.49	--
Outlet(Grab)		7.78	258	4840	957	71	752	0.17	2.91	14.6

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

Table 14.14: Performance of CETP at Ambernath, Maharashtra

Location	Monitoring Date	Parameters								
		pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
Inlet(Grab)	18.10.2012	7.87	403	9142	1621	502	190	--	2.84	--
Outlet(Grab)		8.49	200	7694	721	222	1022	0.11	0.37	2.1

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

Table 14.15: Performance of CETP at Dombivali, Maharashtra

Location	Monitoring Date	Parameters								
		pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
Inlet (Grab)	20.03.2013	7.33	205	3913	1279	857	56.4	--	3.52	--
Outlet (Grab)		7.38	181	3849	450	114	20.7	0.057	0.48	3.6

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

Table 14.16: Performance of CETP at Tarapur (25 MLD)

Location	Monitoring Date	pH	TSS	TDS	COD	BOD	NH_3^{-N}	CN-	Phenols	O&G
Inlet (Grab)	04.05.2012	4.98	915	3597	2914	956	102	--	4.64	--
Outlet (Grab)		7.21	155	3874	1623	591	156	1.21	4.40	51.8
Inlet (Grab)	25.09.2012	6.51	436	3972	2082	1000	40.3	--	10.33	50.9
Outlet (Grab)		8.64	880	4218	1320	470	152	0.23	2.82	21.3

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

It is inferred from monitoring that CETPs in Gujarat and Maharashtra are non-compliant to prescribed norms. Most of the CETPs are having primary & secondary treatment only. Tertiary treatment is not adopted by any CETP except CETPs like

Vapi and Ankleshwar in Gujarat. Inlet effluent characterization indicates significant deviation (on higher side) from the inlet design norms causing shock loads. Many CETPs started taking domestic sewage to improve amenability to biological treatment in recent times. In most of the cases, there is heavy hydraulic load in monsoon season due to lack of separation of storm water & industrial waste water. This results in flooding of units in CETPs & 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. Mostly CETPs have not adopted any treatment to reduce the NH3-N concentration.

The CETPs need to upgrade their treatment capabilities considering the complex nature of the effluent, generated at various units so as to meet the prescribed norms. SPCBs are required to review the CETPs performance regularly with reference to all parameters. While permitting new units to set up or expansion of existing units the capability/performance of concerned CETP may be taken into consideration by the SPCBs. The Central Pollution Control Board has already issued advice to State Pollution Control Boards that, wherever the CETPs are not meeting the discharge norms no further NOC or EC may be granted.

14.3 PERFORMANCE OF FETP AT GUJARAT, ANKLESHWAR

Monitoring of FETP Ankleshwar, Gujarat was carried out under quarterly monitoring programme. Monitoring results are compiled in the database managed for the critically polluted area and depicted in the table 14.17:

Table 14.17 : Performance of FETP at Ankleshwar

Location	Monitoring Date	Parameters								
		pH	TSS	TDS	COD	BOD	NH_3-N	CN-	Phenols	O&G
Inlet	28.04.2012	6.49	200	5096	974	620	92	0.90	4.18	27.7
Outlet		6.38	36	10631	989	131	--	1.22	0.51	2.3
Inlet	08.08.2012	7.32	344	7235	1141	227	91	0.95	0.65	--
Outlet		7.30	143	7039	537	39	146	0.16	0.61	5.6
Inlet	06.12.2012	2.73	121	7108	1392	488	124.1	--	--	--
Outlet		7.02	186	7158	579	75	129.3	0.52	1.135	3.7
Inlet	27.02.2013	8.58	539	7369	2152	624	150	0.52	2.43	67
Outlet		7.49	94	7284	555	52	136.9	0.23	0.91	19
GPCB Discharge Norms		**6.5-8.5**	**100**	**--**	**250**	**100**	**50**	**0.2**	**5**	**10**

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

Figure 14.4 : Final Effluent Treatment Plant (FETP), M/s NCTL, Ankleshwar , Dist Bharuch Gujarat (Final discharge to the Arabian Sea through 53 km pipeline (43.6 km onshore & 9.4 km offshore)

14.4 BIO-MEDICAL WASTE MANAGEMENT

14.4.1 Status on Bio-medical Waste Management:

As per the annual report information received for the year 2011 from the State Pollution Control Boards/Pollution Control Committees (SPCBs/PCCs) except Sikkim SPCB and Director General of Armed Forces Medical Services (DGAFMS), the bio-medical waste management status in the Country is given as follow:

- No. of healthcare facilities : 151535
- No. of beds : 1491147
- No. of Common Bio-medical Waste Treatment Facilities (CBWTFs) : 179 + 22* (under installation)
- No. of healthcare facilities (HCFs) using CBWTFs : 112199
- No. of HCFs having treatment & disposal facilities : 23,668
- No. of healthcare facilities applied for authorization : 84396
- No. of healthcare facilities granted authorization : 79901

14.4.2 Total no. of on-site/captive treatment equipment installed (excluding CBWTFs) by the HCFs:

- No. of incinerators

i) With Air Pollution Control Device : 450

(ii) Without Air Pollution Control Device : 234

- No. of Autoclaves : 3282
- No. of Microwaves : 139
- No. of Hydroclave : 3
- No. of Shredders : 4974

14.4.3 Total no. of treatment equipment installed at CBWTFs:

- No. of Incinerators : 171
- No. of Autoclaves : 166
- No. of Microwaves : 10
- No. of Hydroclave : 5
- No. of Shredders : 172
- Quantity of bio-medical waste generated in Tons/day : 415
- Quantity of bio-medical waste treated in Tons /day : 378
- No. of HCFs violated Bio Medical Waste Rules : 5472
- No. of Show-cause notices/Directions issued to defaulter HCFs : 3585

14.4.4 Inspection/Evaluation of Health Care Facilities and Common Bio medical Waste Treatment Facilities (CBWTFs) on implementation of Bio-medical Waste (Management & Handling) Rules, 1998 MW Rules, 1998

- The request has been made by Haryana State Pollution Control Board to Central Pollution Control Board for fulfillment of Orders of Hon'ble Punjab & Haryana High Court. Accordingly 11 nos. of CBWTFs located in Haryana were inspected by Central Pollution Control Board jointly with Haryana State Pollution Control Board in the month of May, 2012 and the inspection reports of the visited CBWTFs were forwarded to HSPCB, for taking further necessary action at their end.
- As requested by Himachal Pradesh SPCB, CPCB inspected two CBWTFs located at Kullu & Shimla in Himachal Pradesh state. The observations made by the inspection team also communicated to the HPSPCB for ensuring necessary compliance. Directions under section 5 of the E (P) Act, 1986 were issued to the CBWTF located in Shimla for closure of the facility.
- In pursuant to the Hon'ble National Green Tribunal Order dated 23/01/2013 in the matter of Appeal no. 63 of 2012, CPCB (HQ) carried out inspections of 4 nos. of Health Care Facilities in NCR Region of Delhi in February, 2013. CPCB Zonal Office, Bhopal & CPCB Zonal Office, Lucknow also carried out inspections of 5 nos. of HCFs in NCR of Rajasthan state and 9 nos. of HCFs in NCR of Uttar Pradesh state during January/February, 2013 respectively. The observations

made during the visit to the HCFs in the above States were also apprised to the Hon'ble National Green Tribunal as well as communicated to respective states for initiating action against HCFs violating the provisions of BMW Rules.

- The CBWTFs namely 1) Vulcan Waste Management (P) Ltd, Gurgaon, Haryana; 2) M/s Synergy Waste Management (P) Ltd., Subharti Medical College Campus, Subharti Puram, Meerut, UP; 3) M/s Medical Pollution Control Committee, Mandawar, Roorkee, Haridwar, Uttrakhand & 4) M/s Dutt Enterprises Ltd., Agra, Uttar Pradesh were inspected during May & September, 2012 so as to verify compliance to the Bio-medical Waste (Management & Handling) Rules, 1998 and CPCB guidelines/ Directions issued under section 5 of the E (P) Act, 1986.
- During the period October – December, 2012, Central Pollution Control Board inspected 10 nos. of HCFs located in Delhi, Haryana & UP namely 1) Max Hospital A-364, Noida, Uttar Pradesh; 2) Government Hospital, Noida; 3) Fortis Hospital Gurgaon, Haryana; 4) Civil Hospital, Gurgaon; 5) Central hospital and Research Centre, Faridabad; 6) Chawla Hospital, Faridabad; 7) Maharishi Valmiki Hospital , Delhi; 8) Lal Bahadur Shastri Hospital, Khichripur New Delhi; 9) Narinder Mohan Hospital and Research, Mohan Nagar, Ghaziabad; 10) Pushpanjali Crosslay Hospital, Vaishali, Ghaziabad, Central Pollution Control Board requested DPCC, HSPCB & UPPCB to initiate actions against afore-said HCFs for ensuring time bound compliance.
- Central Pollution Control Board, Zonal Offices carried out inspections of 28 nos. of HCFs/CBWTFs in the country and subsequent actions were initiated by Central Pollution Control Board against the concerned HCF/CBWTF for violation of the provisions.

14.4.5 Evaluation of new proposed State of Art treatment technologies for safe disposal of bio-medical waste

Central Pollution Control Board organised 13th & 14th Expert Committee meetings on 'Bio-medical Waste Management' on 28th June, 2012 & 07th January, 2013 respectively at Central Pollution Control Board, Delhi for evaluation of new state-of-the-art-technologies for treatment of bio-medical waste as required under the Bio-medical Waste (Management & Handling) Rules, 1998.

In the 13th Expert Committee meeting proposals on i) "Placenta Anaerobic Bio-Reactor" technology proposed by M/s Krishna Hospital, Cochin & 2) 'ECODAS system' technology proposed by M/s Surgikit, Chandigarh were considered. As per the recommendations of the 13th Expert Committee meeting, the reply received from the proponent M/s Krishna Hospital, Cochin against the specific queries on "Placenta Anaerobic Bio-Reactor" as raised by the expert members as well as additional information / clarifications submitted by M/s Surgikit, Chandigarh with reference

to "ECODAS system" Technology, were discussed in the 14th Expert Committee meeting held on 07th January, 2013.

14.4.6 Initiative taken for cytotoxic drugs waste generated from Cancer Hospitals & Research Centres:

Central Pollution Control Board has prepared a format seeking information with reference to type of cytotoxic drugs used, quantum of cytotoxic drugs generated, present waste management practices from about 120 HCFs (Cancer Hospitals) in the Country and the information received so far from the HCFs is being compiled for preparation of draft guidelines for management & handling of cytotoxic drugs waste generated from Cancer Hospitals.

14.4.7 Common Bio-medical Waste Treatment Facility, North Zone

(A) Biomedical Waste Treatment Facility at Mirzapur Road, Naini, Allahabad

The inspection of CBWTF operated by M/s Ferro Build Hards (I) Pvt. Ltd., Mirzapur Road, Naini, Allahabad was undertaken by the team of CPCB Zonal Office Lucknow along with Regional Office, UPPCB, Allahabad on 14th August, 2012 to check the compliance of directions issued under the provision of Bio-medical Waste (Management & Handling) Rules, 1998. The status of compliance is mentioned in Table 14.18:

Table 14.18 : Status of Compliance & Directions to Bio Medical Waste Treatment Facility at Naini, Allahabad

S. No.	Direction Issued	Status
a.	The Unit shall collect the bio-medical waste from the member health care facilities (HCFs) in accordance with the colour coding containers & bags stipulated under Schedule II of the BMW Rules and shall store such waste only in the designated storage room developed as per CPCB guidelines, by April 30, 2012.	Partially complied because mixed waste is being collected from the members of HCF.
b.	The Unit shall ensure working of the automatic recording system (printer) attached with the incinerator for recording operational parameters of the incinerator & maintenance of the records in accordance with the BMW Rules, with immediate effect.	Complied.
c.	The Unit shall procure flue gas analyser for measurement of CO, O2 & CO2 level in stack emission during the incineration operation and ensure its operation &maintenance of records as per CPCB guidelines, by April 30, 2012.	Complied.
d.	The unit shall make necessary provision for ensuring proper treatment of bio-medical waste by chemical disinfection, with immediate effect.	Complied.
e.	The stack emission of the incinerator shall get analysed through a laboratory recognized under the E (P) Act, 1986 and analysis results with CO2 corrections as required under BMW Rules, submitted to CPCB and UPPCB on monthly basis till June 15, 2012.	Complied.

f.	The Unit shall upgrade existing effluent treatment plant sludge drying bed, by May 15, 2012.	Complied.
g.	The Unit shall complete augmentation of the existing vehicle/ container washing platform with a provision of adequate slope for collection of wastewater and routing the same to the ETP, by May 15, 2012.	Complied.
h.	The Unit shall complete suitable provision of cover for the existing waste sharp pit, by April 30, 2012.	Complied.
i.	The Unit shall provide suitable cover for the existing incineration ash storage so as to avoid entry of rain water during the monsoon by April 30, 2012.	Complied.
j.	The Unit shall complete installation of DG set as standby arrangement for power, to run the treatment equipment during failure of power supply by June 15, 2012 as per the norms notified under the Environment (Protection) Act, 1986.	Complied.

(B) Bio Medical Waste Treatment Facility at Post Graduate Institute of Medical Education & Research (PGIMER), Chandigarh.

PGIMER, Chandigarh was jointly inspected by CPCB Zonal Office, Lucknow & CPCB Head Office, Delhi on September 4, 2012 for verification of compliance of directions issued to PGIMER, Chandigarh, vide CPCB, H.O, Delhi, letter no. B-31011 (BMW)/ 30/ 93/ 2012/ HWMD/ 1127 dated May 29th, 2012. The status of compliance is mentioned in Table 14.19 :

Table 14.19 : Status of Compliance of Directions to Bio Medical Waste Treatment Facility at PGIMER, Chandigarh

S. No.	Directions Issued	Status
1.	There is no conveyer /automatic feeding device for charging the bio-medical waste into the incinerator and manual feeding of waste is in practice.	Not Complied
2.	The system for automatic recording of the operational parameters of the incinerator as well as tamper proof Programmable Logic Control (PLC) based control system are not attached with the incinerator, as required under the CPCB guidelines.	Not Complied
3.	Device for measuring negative draft in primary chamber, air flow rate in the incinerator chamber and pressure drop across venture scrubber are not attached with the incinerator.	Not Complied
4.	Stack emission monitoring is not conducted regularly through the laboratory approved under the E (P) Act,1986 to assess the efficacy of the Air Pollution Control System attached with the incinerator.	Not Complied

5.	Flue gas analyser for measurement of CO, O2 & CO2 level in the stack gases not provided, neither record maintained as per CPCB guidelines.	Not Complied
6.	Auto clave/ microwave required for treatment of bio-medical waste has not been installed in the facility to ensure complete sterilization followed by shredding of bio-medical waste as per BMW Rules.	Not Complied
7.	Proper records related to the disposal of incineration ash is not maintained violating the provisions of Rule 11 of the BMW Rules.	Complied
8.	Submit analysis results of the wastewater generated from HCF for BOD,COD,TSS,pH & O&G being discharged into the public sewer.	Analysis report of the effluent being generated during the incineration of bio-medical waste is not available with the facility operator.
9.	DG set is not attached with the acoustic enclosures as well as stack of adequate height as required under the DG set norms notified under the E (P) Act, 1986.	Not Complied
10.	The Unit shall complete installation of DG Set as stand by arrangement for power, to run the treatment equipment during failure of power by June 15, 2012 as per the norms notified under the Environment (Protection) Act, 1986	Complied
11.	Skilled manpower is not engaged to operate the incinerator installed in the facility in accordance with the BMW Rules. Hence, require training to the concerned health care staff.	Not Complied
	Skilled manpower is not engaged to operate the incinerator installed in the facility in accordance with the BMW Rules. Hence, require training to the concerned health care staff.	Not Complied

(C) Biomedical Waste Treatment Facility at Center for Pollution Control, Varanasi

Center for Pollution Control (CPC), Varanasi was inspected & monitored by the team of CPCB Zonal Office, Lucknow & Regional Office, UPPCB, Varanasi on October 18, 2012 for the verification of compliance of directions issued to CPC, Varanasi, vide CPCB, H.Qs, letter no. B-31011(BMW)/30/83/HWMD/1815-18, dated April 26, 2012. The status of compliance is mentioned in Table 14.20 :

Table 14.20 : Status of Compliance of Direction to Biomedical Waste Treatment Facility at CPC, Varanasi

S. No.	Direction Issued	Status
1.	Installation of measuring devices for negative draft measurement in primary chamber and pressure drop across Venturi Scrubber.	Complied
2.	Installation of mechanical feeding device with the incinerator for feeding the bio-medical waste.	Complied
3.	Upgradation/ Modification of Air Pollution Control System with the incinerator to meet the stack emission norms.	complied
4.	Procurement & installation of flue gas analyzer for regular monitoring of the flue gas parameters such as CO2,CO and O2 during the incineration and maintenance of records as per CPCB guidelines.	Partially Complied.

(D) Inspection of M/s S.S. Systems (I) Pvt. Limited, Faizabad

M/S S.S. Medical Systems (I) Pvt. Ltd., Village Mau Shivalaya, Raebareli Road, Faizabad was inspected on 20.12.2012 by officials of CPCB and U.P. Pollution Control Board (UPPCB) vide CPCB H.O. Delhi letter No. B-31011 (BMW)/30/93/HWMD/783-86, dated May 11, 2011; July 7, 2011; September 30 , 2011; 30 September 2012 and November 30, 2012 advising the industry to submit the time bond action plan along with a Bank Guarantee of Rs. Ten lakhs (Rs. 10.00 Lakhs) and ensure compliance. The status of compliance is mentioned as below:

S. No.	Direction Issued	Status
a	That the Unit shall complete installation of conveyer or automatic feeding device for charging the bio-medical waste into the incinerator and same shall be synchronized with the tamper-proof Programmable Logical Control System as per CPCB guidelines.	Complied, Performance of PLC need to be verified.
b	That the Unit shall complete installation of (i) automatic recording system for recording of operational parameters of the incinerator well as stack gas temperature after scrubbing; (ii) negative draft measuring devices with the primary chamber (iii) air flow rate measuring devices with the primary and secondary chamber of the incinerator and pressure drop measuring device to the venturi scrubber as per CPCB guidelines.	Partially complied
c	That the Unit shall procure & install a flue gas analyzer for regular monitoring of CO, O2 & CO2 level in the stack gases during incineration operation & the records shall be maintained as per CPCB guidelines.	Partially complied
d	That the Unit shall complete installation of data recording system with the autoclave (for recording operational parameters such as temperature, pressure, start and end of sterilization of the autoclave as per provisions of the BMW Rules) and waste feeding mechanism to autoclave as per CPCB guidelines.	Partially complied

S. No.	Direction Issued	Status
e	That the unit shall complete proper ventilation, flooring, proper collection of leachate & wastewater in waste storage & treatment equipment rooms and routed through ETP for necessary treatment as required under CPCB guidelines.	Not complied
f	That the Unit shall use only designated colour coded containers with proper label as per Schedule II & III of the Bio-medical Waste (Management & Handling) Rules,1998, for collection, storage and handling of waste within the facility,	Not complied
g	That the Unit shall maintain records related to the bio-medical waste collected from member HCFs, treated & disposed, operational parameters of the incinerator & autoclave as per BMW Rules and including records w.r.t the diesel consumption as well as power consumption for operation of the facility, with immediate effect;	Partially complied
h	That the Unit shall upgrade the existing Effluent Treatment Plant and operated properly for treatment of wastewater generated from the facility so as to meet the discharge standards prescribed under Environment (Protection) Act, 1986 & upon completion of the upgradation, the analysis results of ETP wastewater got analyzed through a laboratory recognized under E (P) Act, 1986 and results shall be submitted once in a month to CPCB & UPPCB.	Partially complied
i	That the Unit shall complete providing Sharp-pit/encapsulation facility and properly covered pit for disposal of incineration ash in accordance with the CPCB guideline.	Complied
j	That the Unit shall complete vehicle washing platform provision and washwater collection provision and the same shall be routed through ETP to ensure further treatment and disposal;	Complied
k	That the Unit shall provide a shed over the existing DG Set and acoustic enclosure as well as with a provision of stack height as per DG Set norms notified under E (P) Act, 1986, as standby arrangement for ensuring operation of the facility during power failure.	Complied
l	That the Unit shall sale the plastic waste after ensuring treatment by autoclaving only to the recyclers authorized by UPPCB or any other SPCB/PCC henceforth and records in this regard shall be maintained.	Not Complied
m	That the Unit shall stop segregation of bio-medical waste received from the member health care facilities at CBWTF with immediate effect and shall organize awareness campaign to the member HCFs with regard to segregation of bio-medical waste in accordance with the BMW Rules.	Not Complied
n	That the Unit shall complete necessary provisions for Fire Protection equipments (i.e sand buckets, fire extinguishers) in adequate numbers and at appropriate places so as to control fire hazards.	Partially Complied
o	That the Unit shall complete making necessary provisions for protective gear for handling of waste for the facility workers as required under CPCB guidelines with immediate effect.	Not Complied
p	That the Unit shall ensure necessary measures for improvement in housekeeping with immediate effect.	Partially Complied

14.4.8 Common Bio-medical Waste Treatment Facility (CBWTF), Central Zone

In central zone there are 18 operational CBWTFs, the status of compliance verification during the year 2012-13 are as below:

(A) M/s Hoswin Incinerator, Alwar (CBWTF)

Central Pollution Control Board, Zonal Office, Bhopal monitored M/s Hoswin incinerator, Alwar on 27.04.2012 . Monitoring of PM emission, acid mist and CO2 concentration conducted in the stack emission. Combustion gases are monitored by Flue gas analyser (Technovation make model-FEM) to find out the composition of flue gases emitted during incineration. It was suggested that the unit has to take action on following :

The site observations as below :-

- The facility has to make the PLC system of autoclave operational.
- To strengthen the waste handling facility to prevent spillage of waste / sharps.
- To improve housekeeping in incinerator area.
- To increase green belt area by planting more local species of trees.

(B) CBWTF of Elite Engineers, Jabalpur

M/s Elite Engineers was monitored jointly with Madhya Pradesh Pollution Control Board, Regional Office, Jabalpur on 16.08.2012. The facility has installed double chamber incinerator with capacity of 100 kg/Hr. Incinerator with primary & secondary chambers and separate burners in each chambers with automatic sparking. Two series of cyclones for dust control, SS Ventury scrubber for controlling the gaseous pollutants, panel board for operating the incinerator, thermo couples for measuring the temperature attached with PLC showing digital temperature reading along with printer, induced draft (ID) fan for suction of flue gases from the incinerator and exhausted through 30 meter high stack are provided.

The monitoring of stack emissions for PM & CO2, was undertaken to assess the efficacy of APCD. The wastewater samples were also collected from ETP to verify the quality of effluent being utilized for plantation. Compliance status of Direction issued on 26.4.2012 and reply submitted by facility for the same was also, verified during the visit the following are the observations :

- The facility has separate segregation and waste storage room with platform and tile flooring. The curtains and long tongs have been provided to avoid direct contact during segregation of Bio Medical Waste (BMW). The CBWTF operator has also organised awareness camp, workshops and seminar to educate the hospital and paramedical staff for onsite segregation of Bio Medical Waste.

- The facility has installed autoclave of 250 Litres capacity, with additional boiler to achieve the desired steam pressure and reduced cycle time. At the time of monitoring autoclave was working at 1260C against its set temperature of 1210C and pressure 13-16 psi against its set pressure 15 psi. The PLC attached with the autoclave having the facility to print temperature, pressure and operation time. To assess the efficiency of autoclave strip spore testing has been conducted and the efficiency of autoclave found satisfactory.

- The waste water generated from Ventury scrubber, vehicle and floor washing of BMW segregation room commonly sent to ETP, which comprise collection tank, reaction tank, settling tank and disinfection tank followed by activated carbon filter to remove heavy metals in waste water. Treated effluent was being used in land application/gardening in their own premise and reuse in Ventury scrubbing purpose.

(B) CBWTF of M/s Rajputana Biotech Pvt. Ltd. Jaipur.

The Unit is Common Bio-medical Waste Treatment Facility located in Jaipur (Raj.) established in 2008 to collect and treat the biomedical waste generated in rural areas of Jaipur, Dausa and Sikar. Total 173 hospitals, nursing homes and other health care facilities (CHC and PHC) of this region are associated with this CBWTF.

The CBWTF have 100 kg/Hr. capacity double chambered diesel fired incinerator with scrubber and droplet separator, ID fan and 30 meter high stack. The facility has also provided autoclave of 250 Ltr. capacity and shredder of 50 kg/Hr capacity. The facility has installed ETP of 04 KLD capacity for treatment of waste water generated from vehicle and floor washing, the treated water is being utilized in the premises for horticulture and dust separation.

The Unit was jointly inspected on 17.12.2012 by team of officials from CPCB and RSPCB to verify the compliance status and concluded that facility has complied almost all the directions of CPCB, except obtaining the authorisation from RSPCB.

Other works as mentioned in the directions have been found in progress i.e. PLC installation in incinerator and autoclave, floor tiles in process area, separate room for waste segregation and storage, up-gradation of ETP etc.

14.4.9 Common Bio-medical Waste Treatment Facility, South Zone

Out of 36 Common Bio Medical Waste Treatment facilities in the southern states, the following units (Table 14.22) were inspected/monitored to ensure that adequate infrastructure, equipments, storage, treatment, disposal, operation & maintenance of the unit.

Table 14.22: CBWTF inspected, action taken and present status

Name of Unit	Period of Last Inspection	Action Taken	Present Status
M/s AWM Consulting Ltd, Kabaca (V), Yerpadu(M), Chittor (D). Andhra Pradesh	November, 2012	Direction Issued in the month of December 2010 to submit time bound action plan and submit Bank guarantee	Unit has implemented all points mentioned in the direction and complied. Direction revoked
M/s Ken Bio Links, Kandipedu Village, Vellore, Tamil Nadu	January, 2013	Direction Issued in the month of June 2012 to submit time bound action plan.	Inspected/monitored in January 2013 report submitted to CPCB Delhi for necessary action
M/s Shusrutha Bio Medical Waste management Society, Machenahalli, Shimoga, Karnataka	February, 2013	Direction Issued in the month of May 2012 to submit time bound action plan and submit Bank guarantee	Inspected/monitored in February 2013 report submitted to CPCB Delhi for necessary action

14.4.10 Common Inspection of Health Care Facilities

Inspection of 26 Health Care Facilities in NCR and States of Uttar Pradesh, Uttarakhand and Punjab were carried out and observations are summarized below:

- Biomedical Waste (BMW) is not properly segregated and containers/bins are neither labeled nor placed as per schedule-II, III & IV of the Bio-medical Waste (Management & Handling) Rules, 1998.
- Proper record (log book) regarding category wise BMW generation not maintained.
- Authorization from SPCB are not obtained. In several cases application for authorization submitted by Health Care Facilities (HCF) to SPCB are pending for long
- Waste water including blood, urine, pus etc. generated from the HCF is discharged into Municipal drain without any disinfection / treatment.
- Annual returns regarding BMW generated are not maintained / submitted.
- Many HCF have neither obtained membership of Common facility nor ensured adequate individual provision for Biomedical Waste Management.
- In many cases HCF have not applied for Consent under the Water / Air Act.
- Waste is manually handled by unskilled persons. There appears a complete lack of coordination among several agencies (outsourced) involved in waste management; one agency for intra-hospital transfer of waste, one for transportation of waste from the hospital to Common Facility and within the Common facility itself.
- There is no specific team to manage biomedical waste management in the hospital
- Staff engaged in handling biomedical waste requires motivation for quality control activities in waste handling and segregation
- The hospital management lacks in exercising responsibility for a random surveillance of the provisions of collection, treatment, and disposal practices followed by the outsourced agency.

14.4.11 Inspection of Armed Forces' Health Care Facilities in Punjab

Inspection of three Armed Forces Health Care facilities (HCF) at Punjab was undertaken. The HCF inspected include Military Hospitals at Pathankot, Amritsar and Jullandhar. The observations are summarized below:

a. The vehicles/containers used for transporting of Bio medical waste should be in accordance to the notified Rules.

b. Proper operation and stabilization of incinerator before charging biomedical waste should be practiced.

c. Efficacy test of Microwave for the treatment and / or disinfecting of BMW presently not in practice in the HCF and required.

d. Installation of Behive for incinerating the infectious waste is required to be discontinued as it is in violation of BMW Rules 1998, on account of huge potential for generation of carcinogenic hydrocarbons

e. Open burning of biomedical waste should be stopped immediately.

f. Proper maintenance of record for generation and segregation is required.

14.5 PLASTIC WASTE MANAGEMENT

14.5.1 Impact of Plastic Waste Disposal on Soil and Water Quality at Lucknow Dumpsites

Plastics are petro-based polymer made-up of long chain of hydrocarbons and non-biodegradable. Plastics are widely used for storage and packaging of food stuffs and transportation. The usage includes disposable and reusable containers, plastic wraps, cut¬lery, water bottles and baby bottles. Plastic products can be easily found in human residential and occupational environments in high concentrations. After their service life, the plastic products may be landfilled, where due to biotic and abiotic degradation, leaching of plastic additives i.e. heavy metals, plasticizers, stabilizers, unreacted monomers and harmful colorants occur, which ultimately transfer to different segments of environment, contaminating soil and water bodies.

scope of the study

- To collect and identify different types of plastic products and waste from market and dumpsites such as colored plastic bags and containers and gift items, plastic crockery and multilayered plastic and find out leachability of plastic products and waste in laboratory through appropriate testing methods.
- To collect water and soil samples near the dumpsites at Lucknow.
- To study the migrations of phthalate esters from dump sites.

To suggest remedial measures on use of additives in production of plastic products

On the basis of field survey and data concerning to municipal and plastic waste dumping provided by Lucknow Nagar Nigam, relating to two dumpsite locations i.e. a) Ghaila, Hardoi Road (from two locations) and Dudauli, Sitapur Road (from four locations), have been undertaken for digging borewell of 30 meter deep at each locations. The samples were collected for soil and water quality testing using Standard Methods. The soil samples were collected at the surface and further at

regular intervals of 3 meters upto the depth of the constructed well from each location. After construction of well, first static water samples were drawn in triplicate at each location.

pH of Soil Samples

Soil pH is the measurement of the soil acidity (pH<7) or soil alkalinity (pH>7). Soil solutions were extracted from the dumpsite, as well as control soil by lysimetric method for determination of pH. Observations revealed that the pH of dumpsite soil samples collected in post monsoon season was comparatively more basic than the pre monsoon samples.

Chemical Property of Soil Samples

Assessment of soil quality with respect to its chemical composition was also undertaken by evaluating essential mineral level viz. available phosphorous as phosphate (in kg/ha), available potassium (in kg/ha), available nitrogen (in kg/ha) and chloride level (mg/kg). The control and dumpsite soil samples collected after rainfall (post monsoon samples) were comparatively found to be more enriched with essential minerals/ions. Availability of phosphorous and potassium was found to be higher in control soil samples than dumpsite samples indicating the depletion of nutritional quality of dumpsite soil due to dumping of municipal solid waste.

Heavy Metals and Organic Contaminants in Soil Samples :

Heavy metals viz. Cd, Co, Cr, Cu, Pb, Mo, Ti and Zn were analyzed in all control soil (22 nos.) samples (14 pre monsoon + 08 post monsoon) and experimental/ dumpsite soil (88 nos.) samples (66 pre monsoon + 22 post monsoon). In addition level of phthalates viz. Di-methyl phthalate (DMP), Di-ethyl phthalate (DEP), Di-butyl phthalate (DBP), Di (2-ethylhexyl) phthalate (DEHP) and Di-octyl phthalate (DOP) were also determined in leachates (TCLP) of soil samples. Data revealed that Ghaila Landfill site having coarse or sandy texture of soil have greater contamination of inorganic and organic molecules throughout soil profile and in deep aquifers because rain water leachates containing pool of contaminants may easily percolate through it.

Heavy Metals in Water Samples :

Heavy metals viz. Cd, Co, Cr, Cu, Pb, Mo, Ti and Zn were analyzed in all control water (12 nos.) samples (06 pre monsoon + 06 post monsoon) and experimental/dumpsite water (36 nos.) samples (18 pre monsoon + 18 post monsoon). The analytical data indicated that Cd, Co and Ti were found below detection limit (BDL) in all 48 samples. However, Cu and Zn have been present in significant concentration in all samples. Further, levels of Pb, Mo and Cr were found in traces and the concentration above permissible limit was found only in few samples of first strata water. There was no

significant difference in level of heavy metals in pre-monsoon and post-monsoon water samples as seen in case of soil samples. This may be because of dilution due to rains.

Phthalates in Water Samples

The quality of water collected from dumpsite area was assessed with respect to phthalates. This was conducted to estimate the concentration level of phthalates viz. Di-methyl phthalate (DMP), Di-ethyl phthalate (DEP), Di-butyl phthalate (DBP), Di (2-ethylhexyl) phthalate (DEHP) and Di-octyl phthalate (DOP). The levels of different type of phthalates in the dumpsite water as well as control water samples at selected identified locations are presented in Table 14.23. During experiment, Limit of Quantification (LOQ) Limit of Detection (LOD) and recovery were determined by spiked sample method.

Table 14.23 Limit of Quantification (LOQ) and Limit of Detection (LOD) for Phthalate(s)

Compound	Spiked Level in water (µg/l)	Mean Recovery	LOQ (µg/l)	LOD (µg/l)
DMP	10	70%	1.67	0.55
DEP	10	90%	0.28	0.09
DBP	10	76%	0.34	0.11
DEHP	10	85%	0.83	0.27
DOP	10	75%	0.40	0.13

14.6 MUNICIPAL SOLID WASTE MANAGEMENT

14.6.1 Municipal Solid Waste (MSW) Processing Facility at Bareilly (UP)

The inspection of Municipal Solid Waste Management Plant, Bareilly (UP) was undertaken. This facility is located at Gatta no.39/1,40/1 ETC, Razau Paraspur, Bareilly (UP), approx.12 km from the satellite Bus Stand (Bareilly).The MSWMP has installed capacity of 300 Ton/Day of MSW processing. It is spread over an area of 21.2 acres. Salient observations are summarized as under :

- During inspection, construction work of the MSWMP was under progress. As informed by the facility developer, the MSWMP is based on segregation of Municipal solid waste into following types of component/waste:
  - Wet Organic waste (20-30%)
  - Dry Organic waste (30-40%)
  - Recyclable waste (plastic, metals etc.)(3-5%)
  - Inert Material (10-15%)
- Segregation of MSW is proposed to carry out mechanically. Wet Organic Waste is proposed to be used for making compost. Dry Organic Waste is used for making green fuel or fluff, Recyclable Waste like rubber, metals, plastic etc. will

be separated and sold to the market. Inert material & residue is proposed to be sent for sanitary landfill, having an area of 23250 m2.

- The facility was granted NOC for development of Municipal Solid Waste Management Plant with processing capacity of 500 Ton/day by UPPCB during year 2005 for five years. The NOC has since expired on 02.01.2010. The Municipal Corporation has applied for revival of NOC and Authorization from UPPCB.

14.7 HAZARDOUS WASTE MANAGEMENT

14.7.1 Utilization of hazardous Waste as a supplementary resource or for energy recovery or after processing

Rule 11 of the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, 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". Accordingly, Competent Authority of Central Pollution Control Board constituted Technical Expert Committee under the Chairmanship of Shri R. K Garg, Former Managing Director, Indian Rare Earths Ltd, to evaluate the proposal received for grant of approval under Rule 11 of Rules and encourage usage of hazardous waste.

Based on the trial utilization studies conducted through Central Pollution Control Board, Zonal Office, has granted approval 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, spent anode butt, Sulphur Sludge, Spent catalyst-containing precious metals and waste pickling acid after conducting trial utilization studies through Zonal Offices. So far, twenty proposals for such utilization of hazardous waste have been permitted.

14.9.2 CO–PROCESSING OF HAZARDOUS WASTES IN CEMENT KILN

The Hazardous Wastes (Management and Handling & Transboundary Movement) Rules, 2008, provided for a specific section i.e. Rule 11 dedicated to utilization of Hazardous wastes as a supplementary resource or energy recovery or after processing. 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. These are four Cement plants which are co-processing hazardous wastes in Karnataka.

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. First time in India, Ink sludge was co-processed in Boiler at M/s J.K. Tyres, Mysore.

The waste automobile tyres was co-processed in cement kiln with the help of Hot Disc, first time in the country which is refractory lined combustion device with a stationary casing, which is integrated with preheater and calciner systems. The Hot Disc is a simple and effective combustion device that maximizes the substitution of fossil fuels by alternative fuels (tyre, agricultural residue, etc) in a controlled and environmentally sound manner. The average specific heat requirement is 705 kcal/kg clinkers. The calorific value of the tyre is 8040 kcal/kg and the coal is 4664 kcal/kg. By substituting with tyre, the cement plant replaced 19% of the thermal load requirement, the average feed of tyre was about 3.5 T/Hr., and the cost saving per tonne of clinker production is ` 30 per MT of clinker production. The detail of energy utilisation and cost saving is presented in table 14.24 :

Table 14.24: Energy utilized & Cost Saving

Particulars	Value in ₹	Units
Clinker production per day	4900	TPD
Specific Heat Consumption	705	Kcal/kg of clinker
Total heat load requirement	3454500000	Kcal
19% of heat load by tyre	656355000	kcal from tyre
Remaining by coal	2798145000	kcal from coal
Quantity of tyre used	81.6	MT
Quantity of coal used	599.9	MT
Quantity of coal saved	140.72	MT
Cost of Coal	6227	Rs/MT
Cost of 140.72 MT coal (A)	876263.44	Rs
Cost of Tyre	8900	Rs/Mt
Cost of purchase of 81.6 MT tyre (B)	726240	Rs
Actual cost saved (A-B)	150023.44	Rs/day
Cost saving per tonne of clinker production	**30.6**	**Rs / MT of clinker**

14.7.3 Performance Study of Common Hazardous Waste Incinerators

The Group of Ministers constituted to examine the matters related to Bhopal Gas Leak Disaster, and assigned the task of evaluation of the performance of 22 incinerators to Central Pollution Control Board during its meeting held on 22nd October 2012. Accordingly, CPCB has carried out performance assessment studies of all operating common incinerators in the country by involving its resources at Zonal Offices and Head Office. Performance evaluation studies of 15 incinerators (out of 22 incinerators in the country) have been carried out during the period from 11th December 2012 to 07th February 2013. The other incinerators were under shutdown owing to various reasons during the aforesaid period. The report on the technical details including the ranking of the common hazardous waste in order of its compliance to the emission

standards notified under the Environment (Protection) Act, 1986, vide notification GSR 481 (E) dated 26.06.2008 and applicable to Common Hazardous Waste Incinerator alongwith corrective measures to be taken was submitted to the Ministry of Chemical & Petrochemicals, Govt. of India. The findings and recommendation of the assessment study with reference to each of the CHWI also communicated to 09 SPCBs and 14 CHWI operators for taking corrective measures to ensure that the Common Hazardous Waste Incinerators comply with the prescribed emission standards.

14.7.4 Assessment of Performance of Common Hazardous Waste Incineration Facilities in West Zone

Assessment of Performance of Common Hazardous Waste Incineration Facilities in West Zone (Gujarat-02 and Maharashtra-02) was carried out with reference to meeting of Group of Ministers (GoM) on the matter of disposal of UCIL (Bhopal) waste. Source emission monitoring for parameters stipulated in the notification for common hazardous waste incinerator was carried out. M/s C-Tech Environmental Labs, Chennai was engaged for the sampling and analysis including Dioxin and Furan. Two times monitoring in each stack were carried out as per sampling protocol and methods at four facilities. The monitoring results are given in following table:

TABLE 14.25: MONITORING RESULTS OF COMMON HAZARDOUS WASTE INCINERATORS AT WEST ZONE

	Incinerator-I		Incinerator-II		Incinerator-III		Incinerator-IV		Incinerator-V		Standard
Monitoring Date	05.01.13	06.01.13	05.01.13	06.01.13	08.01.13	09.01.13	07.01.13	08.01.13	09.01.13	10.01.13	
Parameters	Sam-ple-1	Sam-ple-2	Sam-ple-1	Sam-ple-2	Sam-ple-1	Sam-ple-2	Sam-ple-1	Sam-ple-2	Sam-ple-1	Sam-ple-2	
O2	14.6	15.8	15.3	15.8	15.2	15.6	17.7	18.1	14.0	18.4	
CO_2	3.8	3.1	4.2	3.1	4.4	4.2	2.4	2.2	5.1	1.9	50
PM	92.7	132.1	90.2	120.3	135.8	132.3	222.7	297.3	125.89	289.2	50
HCl	2.93	3.15	67.83	77.36	2.9965	138.46	3.7311	3.3998	1.582	4.448	200
SO_2	BDL	BDL	13.6	9.98	62.9	111.2	BDL	BDL	BDL	BDL	100
CO	78.7	32.6	25.9	12.4	47.5	69.3	55.8	42	6.7	4.6	20
TOC	64.7	58.6	63.5	79.61	94.92	144.2	49	15.28	20.52	75	4

HF	0.33	0.3566	3.53	3.72	0.1654	7.1085	0.3808	0.71	0.8472	1.0756	**400**
NOx	70.13	86.16	72.89	83.06	73.28	74.83	115.12	130.89	57.02	154.4	**0.1**
Total Dioxin & Furans	0.82	0.782	0.041	0.1052	1.178095	0.374607	2.1085	2.8503	0.8146	5.363	**0.05**
Cd+Tl+their Compounds	BDL	BDL	0.0003	0.0004	BDL	0.0108	0.0039	0.0018	0.0026	0.0051	**0.05**
Hg and its compounds	BDL	BDL	0.00011	0.0001	6.04119 E-05	BDL	0.00053	0.000772	0.000838	0.000662	**0.5**
Sb+As+Pb+Co+ Cr+Cu+ Mn+Ni+V+ their compounds	0.2293	0.1002	0.0208	0.0357	0.319	6.0527	2.425	2.7558	2.9742	4.872	**<3 %**
TOC Ash	2.06	0.64	0.81	0.79	2.65	2.84	1.66	0.96	0.09	0.31	**<5 %**
LOI Ash	19.9	3.44	4.4	4.34	9.75	11.83	0.85	2.27	0.34	1.24	

(All parameters, except Total Dioxin and furans, are expressed in mg/Nm3. Total Dioxin and furan are expressed in ngTEQ/Nm3. All the monitored values are corrected to 11% Oxygen)

It is observed from the analysis results that all the common hazardous waste incinerators are non-compliant with respect to one or more stipulated parameters. PM, TOC and Total Dioxin & Furans were found exceeding the standards except one incinerator-II at Ankleshwar. Storage and handling of incinerable hazardous waste at these facilities were found satisfactory except for incinerator-III.

Plasma-gasification reactor, Common Hazardous Waste Incinerator, M/s MEPL, Ranjangaon, Dist. Pune

View of APCD installed at CHWI, M/s SEPPL, Junakatariya, Kutch

14.7.5 Details of Treatment, Storage & Disposal Facilities (TSDFs) and their state-wise availability

Table 14.26 : State-wise availability of Common Integrated Treatment, Storage & Disposal Facilities (TSDFs), Exclusive Common Incinerators & 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	4	1	4
12.	Haryana	1	-	-
13.	Himachal Pradesh	-	-	1
14.	Jammu & Kashmir	-	-	-
15.	Jharkhand	-	-	-
16.	Karnataka	-	5	1
17.	Kerala	-	-	1
18.	Lakshdweep	-	-	-
19.	Madhya Pradesh	1	-	-
20.	Maharashtra	3	-	1
21.	Manipur	-	-	-
22.	Meghalaya	-	-	-
23.	Mizoram	-	-	-
24.	Nagaland	-	-	-
25.	Odisha	-	-	1
26.	Puducherry	-	-	-
27.	Punjab	-	-	1
28.	Rajasthan	-	1	2
29.	Sikkim	-	-	-
30.	Tamilnadu	1	-	-
31.	Tripura	-	-	-
32.	Uttar Pradesh	2	1	1
33.	Uttarakhand	1	-	-
34.	West Bengal	1	-	-
	TOTAL	**17**	**8**	**13**

14.7.6 TSDF at Village Kher, Tehsil. Pachpadra, Dist. Barmer (Raj.)

The Common TSDF at Pachpadra near Balotra, was inspected by Central Pollution Control Board Zonal Office Bhopal on 08th August, 2012 to verify the compliance of Hazardous Waste (M,H &TM) Rules, 2008.

The project was initiated by Balotra Water Pollution Control and Research Foundation Trust for setting up of TSDF at Village Kher, Tehsil Pachpadra, District Barmer in Rajasthan for disposing the hazardous waste being generated from the CETPs at Balotra, Bithuja, Jasol, Jodhpur and Pali alongwith other wastes like textile, nearby ETPs in Jodhpur and Pali and Oil & Gas sectors (e.g. Oil India and Gail) for reducing transportation cost, which are far from TSDF Udaipur.

- As per the authorization the capacity of the TSDF is 24,000 TPA (5000 TPA secured landfill and 15000 TPA land fill after stabilization). The hazardous waste proposed to be collected from 38 units located in 7 districts.
- The facility has set up the laboratory for finger print analysis and installed various equipment/instruments such as Bomb calorimeter, UV-VIS Spectrophotometer, Muffle furnace, Karl fischer titrator, Hot air oven, Heating mantles, BOD Incubators etc.

14.7.7 TSDF at Gudli, Udaipur (Rajasthan)

The TSDF at Gudli village near Udaipur is promoted by the Udaipur Chamber of Commerce and Industry. The facility was visited by Zonal Office for collection of wastewater samples and to verify the compliance of Hazardous Waste (M,H &TM) Rules, 2008.

- Wastewater samples were collected from six locations around the SLF site (Peizometers-, hand pump-, open dug well-etc.) for analyzing the physico-chemical parameters and heavy metals (Table 14.27).
- The leachate from the SLF has been observed directly pumped to two numbers of solar evaporation ponds for natural evaporation. The capacities of Pond-I and Pond-II are 125KL and 75KL respectively.

- The incinerable waste has been stored as per CPCB guidelines. All the solid and liquid incinerable HW is stored in one shed. All the wastes have been found adequately labelled

as per the guidelines i.e. type, category and quantity. The transportation vehicles used in the facility are fitted with spark arrester at exhaust.

- During the visit samples from four peizometers were collected and the analysis reports of general parameters and heavy metals are presented in Table 14.27 and 14.28. The peizometers no. 1 & 2 are located on upstream side of the SLF, while the piezometer no.3 & 4 are located on downstream side with reference to flow of ground water.

Table 14.27 Results of the samples collected from TSDF Udaipur

S. No.	Location	pH	Conductivity µS/cm	TS mg/l	TDS mg/l	COD mg/l
1	Peizometer No. -01	7.9	144	115	110	5.4
2	Peizometer No. -02	8.1	169	104	100	3.9
3	Peizometer No. -03	8.1	155	109	105	4.4
4	Peizometer No. -04	8.2	142	115	109	4.4
5	Leachate	8.0	170	128	120	4919

Table 14.28 Heavy metal analysis of samples collected from TSDF Udaipur

S. No.	Location	Zn mg/l	Fe mg/l	Cu mg/l	Pb mg/l	Ni mg/l	Cd mg/l
1	Peizometer No. -01	0.032	BDL	BDL	BDL	BDL	BDL
2	Peizometer No. -02	0.040	BDL	BDL	BDL	BDL	BDL
3	Peizometer No. -03	0.371	BDL	BDL	BDL	BDL	BDL
4	Peizometer No. -04	0.058	BDL	BDL	BDL	BDL	BDL
5	Leachate	0.210	0.93	0.18	BDL	1.09	0.11

14.8 STATUS OF IMPLEMENTATION OF E-WASTE (MANAGEMENT & HANDLING) RULES, 2011

E-Waste (Management & Handling) Rules, 2011 have come into effect from 1st May 2012. These rules shall apply to every producer, consumer or bulk consumer, collection centre, dismantler and recycler of e-waste involved in the manufacture, sale, purchase and processing of electrical and electronic equipment or components specified in schedule – I. Two categories of end of the life electrical and electronic equipment namely (i) IT and telecommunication equipment and (ii.) Consumer Electricals and Electronics such as TVs, washing machines, refrigerators and air conditioners are covered under these Rules.

Extended producer's responsibility (EPR) is the main feature of the E-waste (Management and Handling) Rules, 2011, wherein the producer of electrical and electronic equipment has the responsibility of managing such equipment after its 'end of life', thus the producer is responsible for their products once the consumer discards them. Under this EPR, producer is also entrusted with the responsibility to finance and organize a system to meet the costs involved in complying with EPR.

State Pollution Control Boards/Committees are the prescribed authority for implementation of E-waste Rules in respective States. The Central Pollution Control Board is the prescribed authority for implementing Reduction of Hazardous Substances (RoHS) compliance in manufacturing of items listed in Schedule-I.

The producers are required to obtain authorization from SPCB/PCCs for implementing EPR, which can be achieved by setting up of collection centres, or implementing take back systems or joining a collective scheme or joining a collection centre for effective channelization of E-waste to the registered dismantlers/recyclers, which shall be specified in their application for authorization. The scope of implementing the EPR is presented in figure 14.5.

The status of implementation of E-Waste Rules after one year of its enforcement indicate an un satisfactory compliance with respect to authorization of Producers for EPR vis. a vis. non implantation of EPR by the Producers. However, some progress has been observed in some States where few collection centres, dismantling and recycling facilities have come up. The status of implementation across the States is given below:

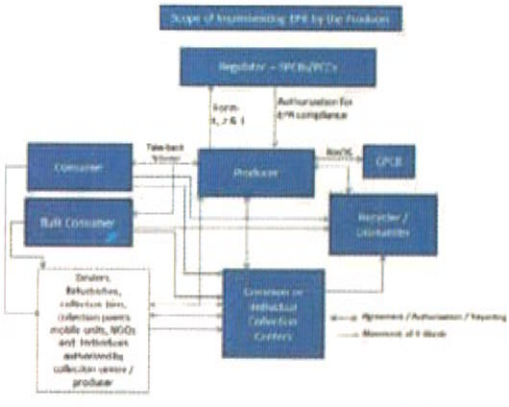


Figure 14.5 : Scope of Implementing the EPR

As per the information available at CPCB fifty six (56) producers have applied for grant of authorisation for managing their EPR in nine (9) states namely AP (1), Delhi (19), Gujarat (2), Goa (1), Karnataka (16), Odisha (1), Rajasthan(3), Uttar Pradesh(5) and West Bengal(8), of which only 28 Producers have been granted authorisation in three states namely Delhi (11), Karnataka (16) and UP (1).

Table 14.29 : Authorizations for EPR issued to Producers

S. No.	State	No of Producers applied for EPR Authorisation	No of Producers granted authorisation for EPR
1.	Andhra Pradesh	1	Nil
2.	Assam	Nil	Nil
3.	Chandigarh	Nil	Nil
4.	Daman & Diu	Nil	Nil
5.	Delhi	19	11
6.	Gujarat	2	Nil
7.	Goa	1	Nil
8.	Karnataka	16	16
9.	Kerala	Nil	Nil
10.	Meghalaya	Nil	Nil
11.	Madhya Pradesh	Nil	Nil
12.	Nagaland	Nil	Nil
13.	Odisha	1	Nil

S. No.	State	No of Producers applied for EPR Authorisation	No of Producers granted authorisation for EPR
14.	Punjab	Nil	Nil
15.	Rajasthan	3	Nil
16.	Tripura	Nil	Nil
17.	West Bengal	8	Nil
18.	Uttrakhand	Nil	Nil
19.	Uttar Pradesh	5	1

Note: Only 19 SPCBs have provided information

As per the information available at Central Pollution Control Board sixty seven (67) collection centres have been granted authorisation in 11 states namely Andhra Pradesh (2), Assam (2), Chandigarh (1), Delhi (6), Gujarat (29), Goa (2), Kerala (2), MP (1), Odisha (5), Uttarakhand (1) and Uttar Pradesh (16). Information on the total collection capacity is presently not available and being collected.

Table-14.27; No of collection centres in States

S. No.	State	Authorisation granted to collection centres
1.	Andhra Pradesh	2
2.	Assam	2
3.	Chandigarh	1
4.	DD&DNH (Daman)	Nil
5.	Delhi	6 granted
6.	15 applications under process	29
7.	Gujarat	29
8.	Goa	2
9.	Karnataka	Nil
10.	Kerala	2
11.	Meghalaya	Nil
12.	Madhya Pradesh	1(five application under processing)
13.	Nagaland	Nil
14.	Odisha	5
15.	Punjab	Nil
16.	Rajasthan	Nil
17.	Tripura	Nil
18.	West Bengal	Nil
19.	Uttarakhand	1
	Uttar Pradesh	16

Note: Only 19 SPCBs have provided information

As per the information available at Central Pollution Control Board one hundred (100) registration has been granted to dismantler/recyclers in eleven states namely Andhra Pradesh (2), Chhattisgarh (1), Gujarat (4), Haryana (4), Karnataka (39), Maharashtra (15), Madhya Pradesh (1), Rajasthan (5), Tamil Nadu (19), Uttrakhand (3) and Uttar Pradesh (7) having total dismantling and recycling capacity to 2,92, 457 MTA.

Table – 14.31 : No. of Registered dismantlers/recyclers

S. No	State	No. of Registered dismantlers/ recyclers	Capacity in MTA
1.	Andhra Pradesh	2	11800
2.	Assam	nil	nil
3.	Chandigarh	nil	nil
4.	Chhattisgarh	1	900
5.	DD&DNH (Daman)	nil	nil
6.	Delhi	nil	nil
7.	Gujarat	4	12431
8.	Goa	nil	nil
9.	Haryana	4	6100
10.	Himachal Pradesh	nil	nil
11.	Karnataka	39	23090
12.	Kerala	nil	nil
13.	Maharashtra	15 (14 dismantler 1 recycler)	20960
14.	Madhya Pradesh	1	6000
15.	Meghalaya	nil	nil
16.	Nagaland	nil	nil
17.	Odisha	nil	nil
18.	Punjab	nil	nil
19.	Rajasthan	5	5130
20.	Tamil Nadu	19	154436
21.	Tripura	nil	nil
22.	Uttarakhand	3	22150
23.	Uttar Pradesh	7	29460
24.	West Bengal	nil	nil
	Total	**100**	**292457**

Note: As per information received from SPCBs/PCCs

14.9 IMPLEMENTATION OF BATTERIES RULES

As per rule 13 of Batteries (Management & Handling) Rules, 2001, Central Pollution Control Board is required to compile the information received from individual States and an annual compliance status report on implementation of Batteries Rules, 2001 to be submitted to Ministry of Environment & Forests. It shall review the compliance of the rules periodically to improve the collection and recycling of used Lead Acid Batteries and appraise the Ministry of Environment and Forests, Government of India. In this regard, SPCB's have been requested time and again to ensure submission of annual compliance report of their States, to which only 11 States have submitted compliance reports for the year 2011-2012.

The information pertaining to eleven SPCBs (namely Punjab, Odisha, Karnataka, Meghalaya, Madhya Pradesh, Chandigarh Pollution Control Committee, West Bengal, Tamil Nadu, Maharashtra and Nagaland) for the year 2011- 2012) has been compiled and presented in Table 14.32

Table 14.32 : Information related to Collection and Recycling of Used Lead Acid Batteries

No of Manufacturer	81
Dealer	1871
Importer	179
Bulk Consumers	441
Auctioneers	1958
Recyclers	147
Total collection of used batteries (MT)	58642
Total LAB recycled MT	13463

The aforesaid data from eleven states indicate gaps and inadequate for reporting annual compliance status to Batteries Rules. All the state boards were requested to ensure submission of Annual Compliance Reports and also requested to take action against those stakeholders who are non-filing returns to state boards/PCCs such as Manufacturer, Recyclers, Importers, Bulk consumer, assemblers, reconditioners and auctioneer as per the provisions of Batteries Rules. SPCBs shall also ensure that all dealers are registered with SPCBs.

Information on annual compliance was not received form 22 SPCBs/PCCs namely: Andhra Pradesh, Assam, Gujarat, Kerala, Rajasthan, Uttar Pradesh, Delhi PCC, Arunachal Pradesh, Bihar, Chhattisgarh, Goa, Haryana, Himachal, Jammu & Kashmir, Jharkhand, Puducherry, Daman & Diu And Dadra & Nagar Haveli, Manipur, Tripura, A & N Islands Pollution Control Committee, Sikkim & Lakshadweep Pollution Control Committee.

14.10 SPATIAL ENVIRONMENTAL PLANNING PROGRAMME

The Spatial Environmental Planning Programme (SEPP) had been commenced in the year 1995 for district wise environmental assessment for siting of industries. Under the programme Central Pollution Control Board had provided financial support to the participating executing agencies and State Pollution Control Board till March 2009.

The present activities under SEPP are mainly related to completion of pending activities and financial settlements. During year 2012-13 Central Pollution Control Board has reviewed Zoning Atlas for Siting of Industries for Dhandhuka Taluka, Ahmedabad (1:5000 scale) and eighteen (18) numbers of District Environmental Atlases prepared by Gujarat Pollution Control Board.

During the year 2012-2013, the advance funds released to SPCBs of Kerala, Assam, Goa and to Environment Protection Training and Research Institute (EPTRI), Hyderabad under this programme, were settled. The executing agencies have been directed to complete all the pending works and utilize the data for planning activities in their respective states.

14.11 BILATERAL PROJECT WITH GOVERNMENT OF FINLAND

A Memorandam of Understanding (MoU) was signed between Central Pollution Control Board in India and VTT Technical Reasearch Centre of Finland on the 'Project for "Capacity Building for Emission Measurements in India" for the following areas pertaining to industrial sectors:

a) Improved capacities in odour measurement technologies;

b) Improved capacities in the measurement of fugitive emissions, especially VOCs, from organic chemical industry; and

c) Improved capacities in emission measurements.

The following activities have been executed during the year:

a) To launch the project, the 1st National Work shop was launched in Delhi between February 8-9, 2012;

b) The 1st Regional Workshop on Source Emission Monitoring (VOCs) for emission measurement was organized in Chennai, Tamil Nadu during August 22nd-24th, 2012;

c) The 2nd Regional Workshop on Fugitive Emission Monitoring was organized in Kolkata, West Bengal on October 04th-05th, 2012.

d) Study visits have been conducted to Finland for technical & scientific persons of the CPCB, SPCB/PCCs:

- The 1st Study visit of one week duration for ten persons to Finland for odour measurement technologies between September 10th-14th, 2012;
- The 2nd Study visit to Finland for fugitive emissions measurement was conducted between April 15th-19th, 2013;

14.12 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 under sponsorship of MoEF. The main outcome of the project are:

a) CPCB's publication "Potential for Adoption of Clean Technologies in SMEs - an introduction " in April 2011;

b) Brought out CPCB's Parivesh News letter " De-colourisation of industrial Effluent – an environmental dilemma in September 2012

c) Draft reports on the following 04 sectoral studies on SMEs have been prepared based on cluster approach as per consent given by the Clean Technology Advisory Committee (CTAC) in May 2012:

- Used oil & waste oil
- Textile wet peocessing
- Tanneries
- Dye & dye intermediates

d) Conducted two regional workshops on SMEs

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

CPCB BOARD MEMBERS
(As on 31.03.2013)

S. No.	Name, Designation with Address	Nominated
1.	Shri Ajay Tyagi Chairman Central Pollution Control Boared 'Parivesh Bhavan', East Arjun Nagar, Delhi – 110 032	Chairman
2.	Joint Secretary Ministry of Mines, R.No. 322 "A" Wing, Shastri Bhavan, New Delhi – 110 001	Member
3.	Advisor (Handling Water Quality Monitoring Works) Ministry of Environment & Forests 'Paryavaran Bhavan', C.G.O.Complex, Lodi Road, New Delhi–110 003	Member
4.	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, Dr. Rajender Pd. Road, New Delhi - 110 001	Member
6.	Additional Secretary and Financial Adviser Ministry of Environment & Forests 'Paryavaran Bhavan', C.G.O.Complex, Lodi Road, New Delhi – 110 003	Member
7.	Chairman Haryana State Pollution Control Board, C-11, Sector – 6, Panchkula (HARYANA)	Member
8.	Chairman Bihar State Pollution Control Board, Beltron Bhavan, IInd floor, Jawaharlal Nehru Marg, Shastri Nagar, Patna 800023, Bihar	Member
9.	Chairman 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.	Smt. Abhilasha Gupta Mayor Allahabad Nagar Nigam, Allahabad	Member
11.	Chairman, Tamil Nadu Pollution Control Board, No. 76, Mount Salai, Guindy, Chennai- 600 032	Member

12.	Ms. Seema Arora, Confederation of Indian Industry, 23, Institutional Area, Lodhi Road, New Delhi – 110 003	Member
13.	Dr. (Ms.) Meenakshi Kakkar, General Manager, Environmental Management Division, Steel Authority of India Limited (SAIL), Lodhi Road, New Delhi – 110 003	Member
14.	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
15.	Shri J.S. Kamyotra Member Secretary Central Pollution Control Board 'Parivesh Bhavan', East Arjun Nagar, Delhi – 110 032	Member Secretary

Annexure III

Annexure IV

SANCTIONED STAFF STRENGTH IN CPCB AND NUMBER OF VACANCIES IN EACH CADRE AS ON 31.03.2013

Sl. No.	Name of the Post	Sanc-ti-oned	Filled		Vacant	Deemed abol-ished/ approv-al for revival awaited	Abol-ished by MoEF
			Regular/ Dep.	Ad-hoc			
Total number of scientific posts at the time of induction of the Flexible Complementing Scheme (Interchangeable)							
1	Scientist 'F' - 02	168	2	-	25	-	-
2	Scientist 'E' - 08		7	-		-	-
3	Scientist 'D' - 22		45	-		-	-
4	Scientsit 'C' - 60		36	-		-	-
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	6	-	1	-	-
10	Law Officer	2	2	-	-	-	-
11	Assistant Law Officer	2	1	-	1	-	-
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	8	-	2	-	-
17	Private Secretary	20	18	-	2	-	-
18	Senior Technical Supervisor	9	8	-	1	-	-
19	Draughting Supervisor	1	1	-	-	-	-
20	Deputy Librarian	1	-	-	-	1	-
21	Senior Scientific Assistant	35	30	-	4	-	-
22	Senior Hindi Translator	1	1	-	-	-	-
23	Technical Supervisor	10	2	-	8	-	-
24	Assistant	19	16	-	3	-	-
25	Data Processing Assistant	4	-	1	3	-	-
26	Senior Draughtsman	2	2	-	-	-	-
27	Junior Engineer (E & M)	1	1	-	-	-	-
28	Junior Engineer (Civil)	1	-	-	1	-	-

29	Personal Assistant	1	1	-	-	-	-
30	Accounts Assistant	8	8	-	-	-	-
31	Junior Hindi Translator	1	-	-	1	-	-
32	Publication Assistant	1	1	-	-	-	-
33	Junior Scientific Assistant	35	27	1	1	-	6
34	Senior Technician	12	8	-	-	-	4
35	Junior Technician	7	7	-	-	-	-
36	Senior Laboratory Assistant	32	28	-	1	-	3
37	Junior Laboratory Assistant	38	26	-	5	-	7
38	Field Attendant	7	7	-	-	-	-
39	Upper Division Clerk	24	21	-	-	-	-
40	Lower Division Clerk	35	15	-	5	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	10	3	-	-	5	2
50	Cashier	6	-	-	-	6	-
51	Pump & Wheel Valve Operator	2	1	-	-	-	1
52	Plumber	1	1	-	-	-	-
53	Attendant	39	22	-	-	8	9
	Total	**612**	**464**	**2**	**74**	**35**	**37**

- 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) is sanctioned, however approval for Recruitment Rules are still awaited.
- Five post of Sr. Technician are abolished by MoEF, however, one post is 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	Senior Hindi Translator	1	-	-	1
5	Junior Hindi Translator	7	-	-	7
6	Hindi Typist (LDC)	7	-	-	7
7	Driver Grade II	3	-	-	3
8	Attendant (Safaiwala)	10	-	8	2
9	Field Attendant	11	-	-	11
	Total	**47**	**0**	**8**	**39**

PARIVESH BHAWAN, CPCB HEAD OFFICE

Central Pollution Control Board

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North TT Nagar,
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2775385/86 (EPABX)
Fax - 0755-2775587

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4677/6003/6634 Fax - 033-24418725

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