GOVERNMENT OF INDIA

MINISTRY OF ENVIRONMENT AND FORESTS

LOK SABHA

STARRED QUESTION NO. 51

TO BE ANSWERED ON 18.02.2009

Most Polluted Cities in the Country

*51. SHRI RAMDAS ATHAWALE:

Will the PRIME MINISTER be pleased to state:

(a) the names of the most polluted cities in the country as per their ranking and their position in the list of polluted cities of the world;

(b) the existing level of pollution in each of these cities;

(c) whether the Government has conducted/proposed to conduct any survey in this regard;

(d) if so, the details thereof; and

(e) the steps taken/proposed to be taken by the Government to check the increasing level of pollution in these cities including Mumbai during the last three years and the current year?

ANSWER

MINISTER OF STATE IN THE MINISTRY OF ENVIRONMENT AND FORESTS
(SHRI NAMO NARAIN MEENA)

(a) to (e) A statement is laid on the Table of the House

STATEMENT REFERRED TO IN REPLY TO PARTS (a) TO (e) OF THE LOK SABHA STARRED QUESTION NO. 51 FOR 18.02.2009 REGARDING MOST POLLUTED CITIES IN THE COUNTRY BY SHRI RAMADAS ATHAWALE

(a)& (b) Central Pollution Control Board (CPCB) in collaboration with State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs) are monitoring the ambient air quality at select locations in the country. Unlike Respirable Suspended Particulate Matter (RSPM), the levels of Sulphur Dioxide (SO_2) and barring Kolkata, the levels of Nitrogen Dioxide (NO_2) are within the National Ambient Air Quality Standards (NAAQS). As many as 85 cities/towns have been observed to be violating NAAQS with respect to RSPM in 2007. Their ranking in decreasing order of RSPM levels has been provided in Annexure I.

There is no standard methodology to rank the most polluted cities of the World. However, various organizations have come out with their ranking of most polluted cities of the World based on different parameters.

(c) & (d) Central Pollution Control Board (CPCB) has set up a nation-wide network of ambient air quality monitoring under National Ambient Air Quality Monitoring Programme (NAMP). Under NAMP, 345 stations are being monitored covering 128 cities/towns in 26 States and 4 Union Territories. Further, source apportionment studies for RSPM have been carried out in 6 cities viz. Delhi, Bangalore, Pune, Kanpur, Mumbai and Chennai. The summary of conclusions of the interim report based on the analysis of one season data of these studies has been provided in Annexure II.

(e) Steps taken by the Government to check increasing levels of pollution in these cities including Mumbai are given below:

(i) Notification of effluent and emission standards under Environment Protection Act,1986;

(ii) Ensuring compliance in 17 categories of highly polluting industries through Environment Surveillance Squad (ESS) programme;

(iii) Implementation of action plan in 24 critically polluted industrial areas;
(iv) Mandatory Environmental Clearance (EC) for industries and development projects;
(v) Introduction of beneficiated coal in thermal power plants;
(vi) Introduction of cleaner technology in industries;
(vii) Augmentation of Mass Rapid Transport System (MRTS) in the country;
(viii) Introduction of clean fuel like CNG in vehicules use;
(ix) Implementation of Bharat Stage III emission norms in 11 mega cities, namely, National Capital Region, Mumbai, Kolkata, Chennai, Bangalore, Ahmedabad, Hyderabad/Secunderabad, Kanpur, Pune, Surat and Agra w.e.f. 01.04.2005 whereas Bharat Stage II emission norms have been made applicable in the rest of the country;
(x) Preparation of zoning atlas for siting of industries;
(xi) Ensuring compliance of air pollution norms for diesel generator sets; and
(xii) Preparation and implementation of action plans for pollution control in 16 highly polluted cities.

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Annexure-I

Most Polluted Cities in Decreasing Order of RSPM Levels (Annual Average Concentrations in Micrograms per cubic meter) Observed in Residential Areas

Order	State	City	RSPM levels (Annual Average Concentrations in micrograms per cubic meter) during 2007 in Residential Areas
1	Punjab	Gobindgarh	252
2	Punjab	Ludhiana	201
3	Uttar Pradesh	Khurja	201
4	Punjab	Khanna	196
5	Uttar Pradesh	Kanpur	193
6	Uttar Pradesh	Lucknow	187
7	Jharkhand	Jharia	180
8	Uttar Pradesh	Firozabad	175
9	Maharashtra	Chandrapur	173
10	Uttar Pradesh	Agra	167
11	Jharkhand	Jamshedpur	166
12	Madhya Pradesh	Gwalior	166
13	Uttar Pradesh	Jhansi	165
14	Uttar Pradesh	Noida	162
15	Delhi	Delhi	159
16	Punjab	Jalandhar	157
17	Haryana	Faridabad	146
18	Karnataka	Hubli-Dharwad	145
19	Jharkhand	Ranchi	136
20	Rajasthan	Jodhpur	132
21	Rajasthan	Alwar	130
22	Chattisgarh	Raipur	125
23	Bihar	Patna	123
24	Madhya Pradesh	Satna	122
25	Rajasthan	Kota	121
26	Uttar Pradesh	Meerut	120
27	Haryana	Hissar	114
28	Uttar Pradesh	Varanasi	114
29	West Bengal	Asansol	112

Order	State	City	RSPM levels (Annual Average Concentrations in micrograms per cubic meter) during 2007 in Residential Areas
30	Maharashtra	Pune	109
31	Madhya Pradesh	Indore	108
32	Jharkhand	Dhanbad	107
33	Madhya Pradesh	Jabalpur	107
34	Uttrakhand	Dehradun	105
35	Gujarat	Jamnagar	103
36	West Bengal	Howrah	103
37	Orissa	Rourkela	101
38	Chattisgarh	Korba	100
39	Assam	Guwahati	99
40	Maharashtra	Nagpur	99
41	West Bengal	Kolkata	99
42	Rajasthan	Jaipur	98
43	Madhya Pradesh	Ujjain	96
44	Andhra Pradesh	Visakhapatnam	95
45	Maharashtra	Solapur	95
46	Punjab	Naya Nangal	94
47	Chandigarh	Chandigarh	93
48	Maharashtra	Mumbai	92
49	Assam	Sibasagar	90
50	Gujarat	Ankleshwar	90
51	Chattisgarh	Bhilai	88
52	Gujarat	Surat	87
53	Gujarat	Ahmedabad	86
54	Andhra Pradesh	Vijayawada	85
55	Madhya Pradesh	Bhopal	84
56	Madhya Pradesh	Nagda	84
57	Gujarat	Vadodara	83
58	Maharashtra	Lote	82
59	Orissa	Cuttack	82
60	Himachal Pardesh	Paonta Sahib	81
61	Andhra Pradesh	Kurnool	80
62	Tamil Nadu	Tuticorin	78
63	Andhra Pradesh	Hyderabad	77
64	Maharashtra	Aurangabad	77
65	Gujarat	Rajkot	76
66	West Bengal	Durgapur	74

Order	State	City	RSPM levels (Annual Average Concentrations in micrograms per cubic meter) during 2007 in Residential Areas
67	Rajasthan	Udaipur	72
68	Orissa	Angul	71
69	Orissa	Bhubaneshwar	71
70	Himachal Pradesh	Damtal	68
71	Nagaland	Dimapur	68
72	Assam	Golaghat	67
73	Meghalaya	Shillong	67
74	Assam	Tezpur	66
75	Maharashtra	Kolhapur	66
76	Andhra Pradesh	Ramagundam	65
77	Kerala	Thiruvananthapuram	65
78	Gujarat	Vapi	63
79	Karnataka	Bangalore	63
80	Madhya Pradesh	Singrauli	63
81	Maharashtra	Amravati	63
82	Himachal Pradesh	Parwanoo	62
83	Karnataka	Hassan	62
84	Orissa	Berhampur	62
85	Orissa	Balasore	62

Note: National Ambient Air Quality Standards (Annual average) for RSPM for residential areas = 60 micrograms per cubic meter.

ANNEXURE – II

INTERIM CONCLUSIONS OF SOURCE APPORTIONMENT STUDIES BASED ON ONE SEASON DATA ANALYSIS

Based on the analysis of data for one season, following interim conclusions could be drawn:

1. Levels of PM_{10} and $PM_{2.5}$ in the ambient air are significantly high irrespective of the type of location. The concentrations of these pollutants are relatively more (PM_{10}: 99 – 277 $\mu g/m^3$; $PM_{2.5}$: 36 – 212 $\mu g/m^3$) at kerbside/ roadside locations.

Table : Indicative prominent sources

City	Indicative Sources
Bangalore	• Vehicles/DG sets • Road dust/re-suspended soil • Construction activities • Biomass/residual oil burning • Secondary particulate
Chennai	• Vehicles/Combustion • Road dust/re-suspended soil • Construction activities • Marine/Secondary particulates
Delhi	• Vehicles • Combustion/DG sets • Road dust /re-suspended soil • Construction activities
Kanpur	• Road dust/re-suspended soil • Combustion/Vehicles • Coal combustion
Mumbai	• Road dust/re-suspended soil • Combustion/Vehicles • Marine/Secondary particulates • Biomass burning
Pune	• Road dust • Vehicles • Agriculture/biomass burning • Construction activities

2. Background locations indicate presence of significant levels of particulates, which could be occurring naturally and/or due to transport of finer dust from other settlements surrounding the cities.

3. Though, there are city-specific variations among the dominance of sources, combustion sources including vehicles & DG sets; and re-suspension of road dust emerge as prominent sources in all the cities for PM.

4. Several epidemiological studies have linked PM_{10} and especially $PM_{2.5}$ with significant health problems. $PM_{2.5}$ is of specific concern because it contains a high proportion of toxins, and aerodynamically it can penetrate deeper into the lungs. Therefore, while planning control strategies greater emphasis is to be given on reduction of $PM_{2.5}$ and toxic constitutes of particulates.

5. The re-suspension of road dust due to vehicular movements on paved/unpaved roads and construction activities, emerging as prominent sources, would largely be contributing to coarser fraction of PM_{10} and combustion sources including vehicles and DG sets would emit particles in the finer size ($< PM_{2.5}$). Hence, strategies for reduction of PM_{10} and $PM_{2.5}$ would involve different categories of sources.

6. Higher fraction of $PM_{2.5}$ in PM_{10}, and higher values of EC and OC (which have more severe health impacts) at kerbside locations indicate that control of vehicular exhaust would be an important element of any strategy or action plan for improving air quality and minimizing adverse effects on the health of people.

7. Presence of high levels of SO_4^{--} and NO_3^-, essentially indicates that in order to control fine dust levels, emissions of Oxides of Nitrogen and Sulphur, which are emitted from combustion sources, need to be brought down even from the sources which are at a distant locations.

8. An effective control strategy would require combination of engineering as well as non-engineering solutions. Some of these are listed below. These are not necessarily in order of priority:

   - Minimizing diesel combustion:
     a. Reduction in use of DG sets by ensuring adequate power supply, stricter norms for DG set emissions

b. Discouraging use of private vehicles, especially diesel-powered ones – lessening price gap in gasoline and diesel for transport sector

- Reformed tax policies – road tax to be based on emission levels, fuel efficiency
- Better vehicle engine technology and emission norms
- Improvement in fuel quality
- Mandatory periodical inspection and maintenance requirements – authorized service stations to issue certificates with details of inspections carried out
- Restricting entry of polluting trucks and heavy duty goods vehicles in the cities
- Application of IT in traffic management solutions
- Better maintenance of roads, paving of unpaved roads, footpaths or low-elevation concreting of unpaved surfaces along major roads with high traffic
- Use of cleaner fuels, stricter emission norms for industries located in and around the cities
- Certain highly polluting areas can be identified as low emission zone and very specific norms be applied including restrictions on certain activities

There could be more such control actions; all of these are required to be evaluated in terms of their feasibility, quantitatively assessed with regard to expected impacts, and ranked in order of priorities for formulation of effective city-specific action plans for improving air quality.

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ADDITIONAL NOTE FOR SUPPLEMENTARY FOR THE LOK SABHA STARRED QUESTION NO. 51 FOR 18.02.2009 REGARDING MOST POLLUTED CITIES IN THE COUNTRY BY SHRI RAMADAS ATHAWALE

Q.1. What is the Purport of the Question?

A. The purport of the question focuses over all scenario of pollution in the country and seeks the names of the most polluted cities in the country as per their ranking and the existing level of pollution in each of these cities. Hon'ble MP has also wanted to know the steps taken/proposed to be taken by the Government to check the increasing level of pollution in these cities including Mumbai during the last three years and the current year. The relevant information with respect the question has been provided in the reply.

Q.2. What are National Ambient Air Quality Standards?

A. National Ambient Air Quality Standards are the limits for levels of air pollutants with an adequate margin of safety to protect the public health, vegetation and property. A copy of notified standards is annexed (Annexure-I).

Q.3. Whether Govt. has carried out any air quality monitoring?

A.:- The Central Pollution Control Board (CPCB) is executing a nation-wide programme of ambient air quality monitoring known as National Air Quality Monitoring Programme (NAMP). The programme was started in the year 1984-85 from Agra and Anpara (W. B.) and gradually the network has been extended to various parts of the country.

Q.4. How ambient air quality is monitored in the Country?

A. Under the National Air Monitoring Programme (NAMP), the Central Pollution Control Board (CPCB) with the assistance of 25 State Pollution Control Boards (SPCBs) in respective States, 4 Pollution control Committees (PCCs) in various UTs along with the National Environment Engineering Research Institute (NEERI – a laboratory of Council of

Scientific and Industrial Research) is monitoring ambient air quality at 345 stations as on 30.09.2008 across the country.

Q.5. How many cities/towns are monitored under NAMP and how many Stations are there?

A. The network consists of 342 operating monitoring stations as on 30.09.2008 covering 128 cities/towns in 26 States and 4 Union Territories across the country (Annexure-II).

Q.6. What parameters are being monitored by CPCB/SPCBs/ PCCs for air quality?

A.:- Under the National Air Quality Monitoring Programme (NAMP), four air pollutants *viz.*, Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Suspended Particulate Matter (SPM) and Respirable Suspended Particulate Matter (RSPM/PM_{10}), are being monitored regularly. Besides these air pollutants, the CPCB is also monitoring Carbon Monoxide, Benzene, Particulate Matter with size less than 2.5 micrometer ($PM_{2.5}$) and ground level Ozone in Delhi.

Q.7. What are routine parameters of Air Quality Monitoring?

A. Sulphur Dioxide (SO2), Nitrogen Dioxide (NO2), Suspended Particulate Matter (SPM) and Respirable Suspended Particulate Matter (RSPM/ PM_{10}) are the routine parameters for air quality monitoring.

Q.8. What are the parameters/pollutants being added for monitoring?

A. Carbon Monoxide, ground level Ozone, Particulate Matter with size less 2.5 micrometre ($PM_{2.5}$), Ammonia, etc. are the parameters will be taken up for monitoring in phase manner in metro cities to begin with.

Q.9. What are the future plans with this regard to continuous Monitoring in the country?

A. The CPCB plans to initiate automatic monitoring in a phased manner in metropolitan and polluted cities. Initially continuous monitoring using automatic monitoring is being initiated in 16 polluted cities identified by Hon'ble Supreme Court apart from Delhi. A total of 33 continuous monitoring stations have been installed so far across the country.

Q.10. Which are the Cities covered under the Supreme Court Judgments regarding Air Quality Management?

A. State-wise details of cities (11 States/16 Cities)** identified in various Supreme Court judgments in April 2002, May 2002 and August 2003 for air quality management are given below:

S.No.	State**	City**
1.	Andhra Pradesh	Hyderabad
2.	Bihar	Patna
3.	Gujarat	Ahmedabad
4.	Haryana	Faridabad
5.	Jharkhand	Jharia
6.	Karnataka	Bangalore
7.	Maharashtra	Pune,Mumbai, Sholapur
8.	Rajasthan	Jodhpur
9.	Tamil Nadu	Chennai
10.	Uttar Pradesh	Agra,Kanpur,Lucknow,Varanasi
11.	West Bengal	Kolkata

SC Order April 2002: Agra, Lucknow, Jharia, Kanpur, Varanasi, Faridabad, Patna, Jodhpur and Pune.

SC Order May 2002: Kolkata and Ahmedabad.

SC Order August 2003: Solapur, Bangalore, Chennai, Hyderabad and Mumbai.

Q.11. What is the Status of Action Plans for the selected Sixteen Cities?

A. The Action Plans for improvement of air quality primarily contain phasing out of old vehicles, use of better quality fuel, improved system for checking of in-use vehicles, traffic management, etc. The respective State Pollution Control Board and State Environment Departments have submitted

the Action Plans, which are at various stages of implementation. The status of implementation is reviewed by two hon'ble high courts, Bhure Lal committee, the Ministry and CPCB.

Q.12.What is RSPM?

A. Respirable suspended particulate matter (RSPM) are the particles with size less than 10 micrometre.

Q.13. What is the Ranking of Cities based on RSPM (dust) levels in Ambient Air during 2007?

A. The cities in decreasing order of RSPM levels are: Govindgarh, Ludhiana, Khurja, Kanna, Kanpur, Lucknow, Agra, Jamshedpur, Noida, etc. as per 2007 data.

Q.14. How many cities have not complied with RSPM norms during 2005, 2006 and 2007? Name a few of them (important ones)?

A. RSPM levels exceeded the prescribed NAAQS in residential areas of 58 cities out of 71 cities during 2005. RSPM levels exceeded the prescribed NAAQS in residential areas of 67 cities out of 83 cities during 2006. RSPM levels exceeded the prescribed NAAQS in residential areas of 82 cities out of 102 cities during 2007. The metro cities where RSPM levels exceeded were Delhi, Kanpur, Lucknow, Kolkata etc.

Q. 15 : How many cities are compliant with RSPM norms during 2005, 2006 and 2007? Name a few of them (important ones).

A. RSPM levels were within the prescribed NAAQS in residential areas of 13 cities out of 71 cities during 2005. RSPM levels were within the prescribed NAAQS in residential areas of 16 cities out of 83 cities during 2006. RSPM levels were within the prescribed NAAQS in residential areas of 20 cities out of 102 cities during 2007. RSPM levels were within the prescribed NAAQS in Kochi, Kottayam, Mysore, Panjim etc

Q.16. What is $PM_{2.5}$?

A. $PM_{2.5}$ are particulate matter with size less than 2.5 micrometre.

Q .17. Name the cities, if any where level of SO_2 are exceeding the norms during 2005, 2006 and 2007.

A. Annual average concentration of SO_2 was within the prescribed National Ambient Air Quality Standards (Annual average) at all the monitoring stations in residential areas of the country during 2005, 2006 and 2007.

Q.18. What is the trend of air pollution in the country?

A. A decreasing trend has been observed in SO_2 levels in cities like Delhi etc. Decreasing trend may be due to various interventions that have taken place in recent years such as reduction of sulphur in diesel, use of cleaner fuel such as CNG in Delhi. Other measures include implementation of Bharat Stage-III emission norms for new vehicles commensurate with improved fuel quality. There has been a change in domestic fuel used in kitchen: coal to LPG and CNG which may have contributed to reduction in ambient levels of SO_2.

Fluctuating trends have been observed in NO_2 and RSPM levels. Various measures such as implementation of Bharat Stage- II/III norms etc have been taken to mitigate ambient NO_2 and RSPM levels but at the same time number of vehicles and DG sets have increased exponentially.

Q.19. What is the Status of Air Pollution in the country?

A. Sulphur Dioxide (SO_2) levels are well within the prescribed National Ambient Air Quality Standards in residential areas of all the cities. Nitrogen Dioxide (NO_2) levels are also within the prescribed in residential areas of most of the cities. Sometimes in Kolkata, Howrah, Delhi and Patna NO_2 level is found above standards, RSPM levels exceed prescribed standards in residential areas of many cities.

Q.20. What are the sources of air pollution?

A. The sources for sulphur dioxide include coal burning, diesel buses, DG Sets, sulphuric acid plants, single super phosphate plants, thermal power plants, steel industry, oil refineries etc.

The sources of nitrogen dioxide include vehicles, DG Sets, thermal power plants, fossil fuel combustion etc.

The sources of particulate matter include vehicles, natural dust, re-suspension of dust, refuse burning, DG Sets, small scale industries, biomass incineration, incinerators, boilers and thermal power plants, commercial and domestic use of fuels, etc.

Generally, the major sources of air pollution are considered to be industries, vehicles and kitchens. Among them, the specific sources of air pollutants in ambient air are given in the table below:

S.No	Air Pollutants	Major Sources
1.	Sulphur Dioxide (SO_2)	Fuel combustion, power station, industrial processes, chemical processes, diesel vehicles, solid waste disposal, smelters.
2.	Nitrogen Oxide (NO_x)	Transport (road, rail, pessenger and commercial), fuel combustion, power station, industrial boilers. chemical processes, waste incinerators, smelters.
3.	Particulate Matter(SPM, RSPM-PM_{10})	Fuel combustion, power station, construction activities, industrial processes, diesel vehicle exhaust, resuspended road dust, domestic refuse burning, domestic wood
4.	Carbon Monoxide (CO)	Transport, combustion, industrial processes, solid waste disposal, refuse burning
5.	Ozone(O_3)	Secondary pollutants formed during photochemical reaction
6.	Organic Compounds	Transport, oil based fuel combustion sources, chemical processes, solvent use, waste incinerator, vaporization of fuel
7	Benzene	Petrol combustion products, petrol filling stations, chemical process.
8	Polynuclear aromatic hydrocarbons (PAH)	Fuel combustion, industrial emission
9	Volatile organic compounds(VOC)	Transport, solvents(especially used in industrial and domestic sector).

10	Trace metals	Fuel combustion, chemical process, transport, metal production and finishing operation, product manufacture
11	Lead(Pb)	Lead additives in gasoline, soil orginated particles.
12	Cadmium(Cd)	Fuel combustion, metal production process, transport.

Q.21. What are the reasons for high particulate matter in the country?

A.:- The reason for high particulate matter levels are natural dust, agricultural practices, steady increase in number of vehicles in most of the cities, re-suspension of traffic dust, emissions from Diesel Generator Sets, small scale industries, biomass incineration, incinerators, boilers and emission from power plants, commercial and domestic use of fuels, etc.

Q 22: What is the procedure to declare Sensitive Zone for the purpose of ambient air quality standards? Name a few Sensitive Zones across NCR and the country

A.: The guidelines for declaring sensitive areas as recommended by Peer and Core group of CPCB are as follows:

1) 10 kms all around the periphery of health resorts that are notified by State Pollution Control Boards in consultation with department of public health of the concerned state.

2) 10 kms all around the periphery of biosphere reserves, sanctuaries and national parks, that are notified by Ministry of Environment and Forest or concerned states.

3) 5 kms all around the periphery of an archeological monument declared to be of national importance or otherwise that are notified by Archeological Survey of India (A.S.I.) in consultation with State Pollution Control Boards.

4) Areas which are delicate or sensitive to air pollution in terms of important agricultural/horticultural crops grown in that area and accordingly notified by State Pollution Control Boards in consultation with department of agriculture/horticulture of concerned state.

5) 5 kms around the periphery of centers of tourism and/or pilgrim due to their religious, historical, scenic or other attractions, that are notified by department of tourism of the concerned state in consultation with State Pollution Control Boards.

One of the identified sensitive areas is Taj Trapezium Zone.

Q.23. What studies CPCB is carrying out on Particulate Matter?

A. The CPCB is carrying out characterization of particulate matter in terms of metals/elements, ions, elemental carbon and organic carbon. In addition, the CPCB through various agencies is carrying out studies on source apportionment of particulate matter in ambient air in six cities to identify percentage contribution of various sources to ambient particulate matter. Also, emission inventory is undertaken in six cities namely Delhi, Mumbai, Chennai, Bangalore, Kanpur and Pune.

Q.24. What are the Objectives of Source Apportionment Studies?

A. The objectives of the frame work for Source Apportionment Studies include preparation of emission inventory, emission profile, monitoring of ambient air quality, assessment of data and its authentication and source apportionment of RSPM (PM_{10}) using factor analysis and reception modeling. Application of Chemical Mass Balance (CMB-8) Receptor model and ISC dispersion model have been include in the study.

Q.25. Whether Source Apportionment Study has been Undertaken?

A. To evaluate contribution from various sources to air quality, Source Apportionment (SA) Studies were initiated by Oil Companies in August, 2003 by signing an MoU between Indian Oil Corporation (IOC) and The National Environmental Engineering Research Institute (NEERI), for study in Delhi. The study was subsequently was taken over by the Ministry of Env & Forest and extended it to cover six cities with various institutions with the help of an estimated cost of about Rs. 20 crores. Details of the cities and institutions are as following:

S. No.	City	Institute
1.	Delhi	National Environmental Engineering Research Institute (NEERI), Nagpur

2.	Bangalore	The Energy Research Institute (TERI), Delhi
3.	Chennai	Indian Institute of Technology (IIT), Chennai
4.	Mumbai	National Environmental Engineering Research Institute (NEERI), Nagpur
5.	Pune	Automobile Research Associated of India (ARAI), Pune
6.	Kanpur	Indian Institute of Technology (IIT), Kanpûr

Q.26. What will be the outcome of the Source Apportionment Studies?

A.. The study will result in formulation of appropriate air quality management plan for respective cities and would provide a basis for guidance in formulation National Policy in Air Quality Management.

Q.27. What is the Mechanism for Appraisal of The Source Apportionment Studies?

A. For appraisal and guidance during the survey and study, a National level Steering Committee under the Chairmanship of Secretary (E&F) has been constituted. The Committee is guiding the study and assessing the achievements of predefined milestones. The Committee will also take decisions on financial matters. Three meetings of the Steering Committee are held in October 2005, February 2007 and October 2007 and various modalities have been finalized.

In order to provide technical assistance and guidance during data collection, use of appropriate model etc. a technical Committee has also been constituted under the chairmanship of Chairman, CPCB and Members drawn from various technical institutions and organizations. The Technical Committee would approve Terms of Reference for different studies, approach, methodology, work plan and deliverables etc. So far a number of meeting of Technical Committee in July 2005, October 2005, March 2006, August 2006, January 2007, August 2007, January 2008, March 2008 and April 2008 have been held.

Q.28. What is the present status of work of Source Apportionment Studies?

A. CPCB has signed Memorandum of Contracts (MoCs) for source apportionment studies for the cities of Mumbai, Chennai and Kanpur with NEERI, IIT- Mumbai and IIT- Kanpur respectively as well as for source profiling for sources other than vehicles with IIT Mumbai. The Automotive Research Association of India (ARAI), Pune has conducted studies on emission factors for vehicles required as inputs in the studies. Data collection is complete. Report writing is in progress.

Q.29. What are the budget proposals for Source Apportionment Studies in CPCB Budget During XI Plan?

A. The budget proposals for Source Apportionment Studies are 2008-09 (200 lacs), 2009-10 (100 lacs), 2010-11 (300 lacs) & 2011-12 (600 lacs).

Q.30. What are the Future Plans for Source Apportionment Studies?

A. The data collection has been completed. The result would then be evaluated by Technical Committee and International Peer Review is also proposed. The final outcome of three season data would be available by June, 2008. These steps have been proposed because source apportionment studies of this magnitude and nature are being carried out for the first time in India and policy decisions are to be taken on the basis of outcome of the studies.

Q.31. Whether any health studies have been carried out by CPCB?

A. The CPCB has sponsored two epidemiological studies to the Chittaranjan National Cancer Institute (CNCI), Kolkata. These studies are on adult and children in Delhi. No definite conclusions can be drawn. The findings are being peer reviewed.

Q.32. What is Road map for Vehicular Standards in India?

A. Road map for Vehicular Standards in India is as following:

Norms	Cities of implementation	Effective date	Type of Vehicles

India Stage 2000 (Euro– I)	**Throughout the country**	**April 2000**	**All Vehicles**
Bharat Stage- II	Delhi, Mumbai, Kolkata, Chennai, Hyderabad, Bangalore, Pune, Ahmedabad, Kanpur, Surat & Agra	2000-2003	**All Vehicles except 2 & 3 wheelers**
	Throughout the country	1.4.2005	All vehicles
Bharat Stage- III	Agra, Ahmedabad, Bangalore, Chennai, Delhi, Hyderabad, Kanpur, Kolkata, Mumbai, Pune and Surat	1.4.2005	**All Vehicles (except 2 & 3 wheelers)**
	Throughout the country	1.4.2010	All vehicles, For 2 & 3 wheelers in the country from 1.4.2008 not later than 1.4.2010
Bharat Stage- IV	Agra, Ahmedabad, Bangalore, Chennai, Delhi, Hyderabad, Kanpur, Kolkata, Mumbai, Pune and Surat	1.4.2010	All vehicles except 2 & 3 wheelers

Q.33.What is the background of the Auto Fuel Policy report?

A.. On 13 September 2001, the Government of India constituted a committee of experts of national repute, headed by Dr R A Mashelkar, the then Director General, Council of Scientific and Industrial Research (CSIR) to recommend an Auto Fuel Policy for the country, to devise a road map for its implementation and recommend suitable auto fuels, automobile technologies and fiscal and institutional measures. The Expert Committee submitted its final report on 25 September 2002. The Cabinet approved the recommendations of Auto Fuel Policy report on 06.10.2003. All of the recommendations were approved by the cabinet with minor modifications in the dates of implementation for inter-state buses & trucks, fiscal measures, etc.

Q.34. Name 11 metro cities those have been selected by the Auto Fuel Policy for implementation of stricter emission norms?

A. Auto Fuel Policy report marked out 11 cities, namely, Delhi, Kolkata, Mumbai, Chennai, Hyderabad, Ahmedabad, Surat, Pune, Bangalore, Kanpur, and Agra for stricter standards due to the high levels of air pollution in these cities.

Q.35. What Road- Map has been proposed for New Vehicles in 11 metro cities?

A. New vehicles (other than 2- and 3-wheelers) in these cities are meeting Euro III norms and Euro IV emission norms would be met by 1 April 2010.

Q.36. What Road Map has been proposed for New Vehicles in the entire country?

A. For entire country, the proposed roadmap is implementation of Bharat stage-III norms and Euro-IV norms in 11 cities by 2010.

Q.37. What Road Map has been proposed for 2 & 3 Wheelers across the country?

A. For two- and three-wheelers, the Committee recommended Bharat Stage III norms preferably from 1 April 2008 but not later than 1 April 2010 in the entire country.

Q.38. What Road Map has been proposed for in-use vehicles?

A. The road map proposed for the following in a prescribed time framework:

- New PUC checking system for all categories of vehicles;
- Inspection & Maintenance (I&M) System for all categories of vehicles;
- Performance checking system of catalytic converters and conversion kits installed in vehicles;
- Augmentation of city public transport system; and
- Emission norms for In-Use Buses, Taxis & Three Wheelers.

Q.39. How much emission reduction from vehicles is expected with the implementation of Auto Fuel Policy Road Map?

A. With the implementation of road map, it is expected that emissions from vehicles will reduce in various cities of country as Carbon Monoxide, Hydro Carbon, Nitrogen Dioxide and particulate matter will reduce. However, the emission quantum is increasing as number of vehicles is rising day by day.

Q.40. Details on emission norms for petrol & diesel vehicles in India?

A. Details on emission norms proposed for petrol & diesel vehicles in India are as follows:

Emission norms for passenger cars (Petrol)

Norms	CO(g/km)	HC+ NOx)(g/km)
1991Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35(combined)
Bharat Stage-IV	1.0	0.18(combined)

Emission norms for Heavy diesel vehicles:

Norms	CO (g/ kwhr)	HC(g/kwhr)	NOx(g/ kwhr)	PM (g/kwhr)
1991 Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15
Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02

Emission Norms for 2/3 Wheelers (Petrol)

Norms	CO (g/km)	HC+ NOx (g/km)
1991 norms	12-30	8-12 (only HC)
1996 norms	4.5	3.6
India stage 2000 norms	2.0	2.0
Bharat stage-II	1.6	1.5
Bharat Stage-III	1.0	1.0

Q.41. What is NIP (National Implementation Plan) and action which will be performed by CPCB?

A. The Stockholm Convention on Persistent Organic Pollutants (POPs), which was adopted in May 2003 with the objective of protecting human health and the environment from POPs, came into force in India on 13th April 2006.

Parties to the Stockholm Convention are required to develop National Implementation Plans (NIPs) to demonstrate how their obligations to the Convention will be implemented. Under article 7 of the Convention States, Each party shall:

(a) Develop and endeavour to implement a plan for the implementation of its obligations under this convention;

(b) Transmit its implementation plan to the Conference of the Parties within two years of the data on which this convention enters into force for its; and

(c) Review and update, as appropriate, its implementation plan on periodic bases and in a manner to be specified by a decision of the Conference of the Parties.

The Central Pollution Control Board (CPCB), NEERI, Nagpur and NIST, Trivendrum would take up task of Inventorization of Dioxin & Furans and also, develop an Action Plan for mitigation of the same in India; as a part of the exercise on preparation of NIP for India.

Q.42. What are Dioxins and Furans?

A. Dioxins and Furans are gases emitted by burning of plastics, bio mass and garbage, improper operation of incinerators, etc.

Q.43. Name the POPs/Dirty Twelve?

A. These are Dioxins, Furans, DDT, Poly-Chlorinated By- Phynel (PCB), Aldrin, Chlorodane, Deldrin, Endrin, Hepta-chloro, Hexa-Chloro Benzene (BHC /Lindane), Mirex and Toxaphene.

Q.44. What are POPs or Dirty Twelve?

A. Persistent Organic Pollutants (POPs) are, as the name suggests, persistent and extremely toxic. Even when released in relatively small quantities they degrade very slowly. POPs are lipophllic and hence bioaccumulate in the fat tissue of organisms once exposed. They move from one level to higher level in the food chain and biomagnity. Furthermore, POPs have the ability to travel and concentrate in the environment and biota of regions far away from the original source of production through the long-range transport mechanisms through air and water. Thus POPs is an issue of national, regional and global concern.

Broadly, a group of pesticides & Insecticides consisting of Alpha BHC, Beta BHC, Gama BHC (Lindane), OP DDT, PP DDT, Alpha Endosulphan, Beta Endosulphan, Dieldrin, Carboryl (Carbamate), 2.4D, Aldrin, Malathian, Methyl Parathian, Anilophos, Chloropyriphos are POPs.

Q.45. Name the 17 category of Highly Polluting Industry?

A. These are: Aluminium Smelters, Chlor-Alkali Plants, Cement Plants, Copper Smelters, Distillery Industry, Dyes & Dye-Intermediate Industry, Fertilizer Industry, Iron & Steel Plants, Tanneries, Pesticide (basic) Manufacturing, Petro-Chemicals, Pharmaceuticals (basic) Plants, Pulp & Paper Industry, Petroleum Oil Refinery, Thermal Power Plant and Zinc Smelters.

Q.46. How many Categories of Standards have been Notified?

A. Environmental Standards for 101 category of industries and Diesel Generator (DG) sets have been notified. It includes large scale 17 category

of highly polluting industry namely, Distillerly, Sugar, Thermal Power Plant, Oil Refinery, etc. and small scale industry like brick kilns, foundry, etc. Emission Standards for DG sets have been notified and being implementation at manufacturing stage.

Q.47. What is Beneficiation of Coal?

A. The process of reducing ash content in Coal Washaries to required level in Coal for better thermal efficiency is called 'beneficiation of coal'.

Q.48. When Notifications on Beneficiated Coal were issued? What are the conditions?

A. The Ministry of Env. & Forests, have issued Gazette Notifications on 19.09.1997 and 30.06.1998 asking thermal power plant to use beneficiated/blended coal having ash content not more than 34% on annual average basis with effect from June 2001, under following circumstances:

1) Power plants located beyond 1000 km from pit head of coal mine;

2) Power plant located in critically polluted area, urban areas and in ecological sensitive area;

3) Power plant should not be using fludised bed combustion (FBC) or integrated gasification combined cycle (IGCC) technology.

Q.49. What is the concept of CREP (Corporate Responsibility for Environmental Protection)?

A. CREP is a commitment for protection of environment for partnership and participatory action of the stakeholders i.e. industry, their associations and regulatory agencies. The Charter of CREP is a road map for progressive improvement in environmental management systems.

CREP is beyond compliance through adoption of clean technologies, commitment, voluntary initiatives of industry for responsible care and improvement in environmental management practices.

Q.50. When CREP concept was introduced in the country?

A. It was done during 2002-03.

Q.51. What is the Achievement of CREP?

A. Specific progress have been made in various sectors as a part of CREP recommendation. For example:

i Strict standards for cement industries were notified which are being compiled with;

ii 12 industry manufacturing caustic soda and chlorine gas have given commitment to convert Mercury Cell Process to Membrane cell by 2012. Membrane cell is a clean technology.

Q.52. How many Task Force are constituted for implementation of CREP at National Level?

A. A total of eight industry specific task forces have been constituted. These are:

1. Cement, Copper and Zinc Industry;
2. Thermal Power Plants and Iron and Steel Plants;
3. Pulp and Paper, Distillery and Sugar Industry;
4. Aluminium Industry;
5. Oil Refinery, and Petrochemical;
6. Pesticides, Pharmaceuticals and Dyes & Dye Intermediates;
7. Chlor- Alkali and Fertiliser Industry; and
8. Tanneries.

Q.53. How many Continuous Air Quality Monitoring Stations are installed in the Country? Please name the cities.

A. A total of 33 Continuous Monitoring Stations have been installed in the country. These are procured by State Pollution Control Boards and CPCB. The continuous stations installed so far in following cities: Delhi, Kolkata, Haldia, Hyderabad, Bangalore, Mumbai, Pune, Solapur, Vadodara, Ahmedabad, Lucknow, Ghaziabad, Chennai, Cuddalore and Simla.

Procurement is under progress for 30 more such stations which will be installed. In total, continuous air monitoring will start in 16 Action Plan Cities, Delhi and other important cities.

Q.54. What is your vision for the future to improve ambient air & vis-à-vis to Control Air Pollution?

A. These are:

- After successful commissioning of Source Apportionment Study (SAS) for six studies and availability of results, recommendations will be drawn. SAS may be repeated in other important cities to ascertain the contribution of various sources to fine dust particulate matter in ambient air.

- The finding will be used for policy interventions i.e. as inputs to Auto Fuel Policy, Ambient Air Quality for 16 non-attainment cities.

- After introduction of Metro for public transport in Mumbai, Hyderabad, Bangalore etc. The emission standards for highly polluting industry are being reviewed and notified. After implementation of the revised emission standards, ambient air quality will improve in the vicinity of industry.

Q.55. What are the shortcomings/gaps in Air Pollution Control?

A. These are:

- The non-availability of appropriate technology for controlling air pollution in SSI sector;

- The CETP type scheme is not possible for controlling air pollution in SSI or medium scale industry;

- It is not possible to replace private vehicles even in phased manner so as to control air pollution due to vehicles;

- The LPG natural gas or bio-gas as domestic fuel in urban and rural areas is not available for all the kitchens; and

- There is no control over geo-climatic conditions resulting in higher dust pollution in urban areas.

Q.56. What is the scope for improvement for Ambient Air?

A. These are:

Air quality will be improved in terms of suspended solids (dust), carbon monoxide and oxides of nitrogen by following steps:

- Cleaning the urban roads and national highways with water jets and mechanical vacuum cleaner on daily basis;
- Grade separators, fly-over and under passes on all crossing;
- Strengthening public transport with respect to convenience, reability and efficiency; and
- Siting of highly air pollution industry away from urban centres.

Q.57. What are the standards for treated effluent quality of Common Effluent Treatment Plants(CETPs) for discharge.

A. The effluent standards for discharge of treated effluent from CETPs into coastal marine areas have been notified under Environment(Protection) Act, 1986 and the major parameters are give below:-

Parameters	Standards
pH	5.5-9.0
BOD (3 days at 27^0C)	100 mg/I
Oil & Grease	20 mg/I.
Temperature	45^0C at the point of discharge
Suspended Solids	100 mg/I for process waste water
Nickel	5.0 mg/I
Mercury	0.01 mg/I
Total residual Chlorine	1.0 mg/I

Q.58. What are the important Environmental Laws in the country?

A.
- Water (Prevention and Control of Pollution) Act, 1974;
- Air(Prevention and Control of Pollution) Act, 1981;
- Water Cess Act; 1977
- Environment (Protection) Act, 1986 and rules thereunder.
- Public Liability Insurance Act, 1991;
- National Environmental Tribunal Act, 1995; and
- National Environmental Appellate Authority Act, 1997

Q.59. Is there any legal and institutional framework to check pollution in the country?

A. In addition to control and state Pollution Control Boards and Pollution Control Committees for UTs, the following 6 Environmental Authorities have been constituted under the Environment (Protection) Act, 1986:

- The Central Ground Water Authority;
- The Aqua Culture Authority ;
- The Dahanu Taluka Environment(Protection) Authority;
- The Environment Pollution(Prevention & Control) Authority for National Capital Region of Delhi;
- The Loss of Ecology(Prevention and Payment of Compensation) Authority for State of Tamil Nadu; and
- The National Environment Appellate Authority, 1997.

Q.60. What are the specific functions of the Pollution Control Boards?

A. Functions of the Central Pollution Control Board:

- Advise the Central Government of matters relating to pollution;
- Coordinate the activities of the State Boards;
- Provide technical assistance to the State Boards, carry out and sponsor investigations and research relating to control of pollution;
- Plan and organize training of personnel;
- Collect, compile and publish technical and statistical data, prepare manuals and code of conduct;
- To lay down standards;
- To plan nation wide programme for pollution control.

Functions of the State Pollution Control Boards:

- To advise the State Government on matter relating to pollution and on siting of industries;
- To plan programme for pollution control;
- To collect and disseminate information;
- To carry out inspection;
- To lay down effluent and emission standards;
- To issue consent to industries and other activities for compliance of prescribed emission and effluent standards.

Q.61. Whether Ministry provides financial assistance to State Pollution Control Boards/PCCs?

A. Ministry of Environment & Forests (MoEF) provides financial assistance to the State Pollution Control Boards/PCCs on specific projects relating to prevention and control of pollution. Ministry provides financial assistance on following programmes:

- Specific projects for abatement of pollution;
- Hazardous waste management ;
- Management of municipal solid waste; and
- Strengthening of Pollution Control Boards(for laboratory upgradation).

Q.62. What are areas under which pollution levels have decreased due to various steps taken?

A. Due to various steps taken by the Government the results achieve include:

- Reduction of levels of air pollutants in respect of sulphur dioxide and nitrogen dioxide i.e. within norms;
- Increase in compliance rate in respect of 17 categories of polluting industries; and
- Containment/reduction in the pollution load entering in the rivers due to installation of treatment plants.

Q.63. How many water quality monitoring stations are there in India?

A. CPCB is conducting water quality monitoring at 1365 stations in 27 States and 6 Union Territories. The monitoring is done on monthly or quarterly basis in surface waters and on half yearly basis in groundwater. The monitoring network covers 282 Rivers, 100 Lakes and other water bodies including 397 Wells.

Q.64. Whether the water quality of rivers is being monitored?

A. Water Quality of 282 rives is being monitored as per the designed monitoring programme of CPCB.

Q.65. How do we identify that our rivers and water bodies are polluted?

A. We identify the level of pollution in our water bodies through a regular water quality assessment programme. The water quality data so obtained are compared with desired water quality based on the use of water body.

Q.66. What are the kinds of pollution that affect water quality of rivers in our country?

A. In our country sewage is major water pollutant. In addition, there is a significant amount of industrial pollution and water pollution from agricultural sources.

Q.67. What are micro pollutants?

A. Micro pollutants are toxic substances consisting of toxic metals and persistent organic pollutants (Group of Pesticides & Insecticides)

Q.68. Name the toxic metals.

A. Toxic metals are Arsenic, Cadmium, Chromium, Lead, Mercury, Zinc and Nickel etc.,

Q.69. How frequently micro pollutants are measured?

A. Micro pollutants are measured once in a year only at selected locations.

Q.70. How does water pollution affect us?

A. The water pollution affects us in many ways. It affects the human health when polluted water is used for drinking or bathing. Water pollution also affects agricultural and industrial activities. It damages the ecological balance of water bodies, thereby reducing productivity of aquatic environment including fish production and quality of fish. Some pollutants get accumulate in the food chain and affect all life forms involved.

Q. 71. What is the concept of designated best use?

A.: CPCB has taken the uses of water as base for identification of water quality objectives for different water bodies in the country. It was considered ambitious to maintain or restore all natural water body at pristine level. Since the natural water bodies have got to be used for various competing as well as conflicting demands, the objective is aimed at restoring and/or maintaining natural water bodies or their parts to such a quality as needed for their best uses. Thus, a concept of "designated best use" (DBU) was developed.

According to this concept, out of several uses a water body is put to, the use which demands highest quality of water is termed as "designated best use", and accordingly the water body is designated.

Q. 72: What is Primary Water Quality Criterion and its phase of development?

A. Primary water quality criteria is a set of 8 parameters indicating limits and ranges in respect of pH, DO, BOD, Total Coliform, Free Ammonia, Boron, SAR and Electrical Conductivity. The primary water quality criteria for Designated Best Uses of water are given below:

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	1. Total Coliforms OrganismMPN/100ml shall be 50 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 6mg/l or more 4. Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organised)	B	1. Total Coliforms Organism MPN/100ml shall be 500 or less 2. pH between 6.5 and 8.5 3. Dissolved Oxygen 5mg/l or more 4. Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	1. Total Coliforms Organism MPN/100ml shall be 5000 or less 2. pH between 6 to 9 3. Dissolved Oxygen 4mg/l or more 4. Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	1. pH between 6.5 to 8.5 2. Dissolved Oxygen 4mg/l or more 3. Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled	E	1. pH between 6.0 to 8.5 2. Electrical Conductivity at 25°C micro mhos/cm Max.2250 3. Sodium absorption Ratio Max. 26

Waste disposal		4. Boron Max. 2mg/l

Q.73. What is the over all water quality status of rivers in India?

A. Total numbers of samples analysed indicate that BOD less than 3 mg/l, 3 to 6 mg/l and above 6 mg/l were 69%, 18% and 13%, respectively. The total number of observations having Total Coliform number less than 500 MPN/100 ml was 50%, between 500-5000 MPN/100 ml was 33% and exceeding 5000 MPN/100 ml was 17% MPN/100 ml. The number of observations having Faecal Coliform bacterial count less than 500 MPN/100 ml was 66%, between 500-5000 MPN/100 ml was 23% and 11% observations were exceeding 5000 MPN/100 ml

Q.74. Which are the most polluted rivers in India?

A. The most polluted rivers with respect to BOD are given below.

River	Location	BOD, mg/l	State / UT
Amalkhadi	Ankleshwar	714	Gujarat
Ghaggar	Moonak	626	Punjab
Khari	Lali village, Ahmedabad	320	Gujarat
Musi	Hyderabad	225	Andhra Pradesh
Sabarmati	Ahmedabad	207	Gujarat
Kalinadi	Kannuaj	136	Uttar Pradesh
Khan	Kabitkhedi, Indore	120	Madhya Pradesh
Damanganga	Kachigaon, d/s Daman	112	Daman
Kalinadi	Muzaffarnagar	110	UP
Hindon	Saharanpur	60	Uttar Pradesh
Yamuna	Down stream Delhi	59	Haryana
Bharalu	Guwahati	43	Assam
Krishna	Islampur	40	Maharshtra
Satluj	Hussainwala	40	Punjab

	Firozpur		
Bhima	Pune	36	Maharshtra
Gomti	Sitapur	25	Uttar Pradesh

Q.75. What are the sources of pollution in rivers?

A. The rivers in the country are polluted by the discharge of treated and untreated municipal wastewater and industrial effluent. All the large and medium industries have installed effluent treatment plant and are meeting the prescribed standards (30 mg/l) at large, however, the cumulative impact of many industrial point sources add to higher concentration in some pockets of the country. In case of municipal wastewater it is estimated that Class-I cities (423) and Class-II towns (499) generate more than 33000 Million Litres of sewage per day against which the treatment capacity exists only for about 7000 Million Litres per day of sewage. Thus there is a large gap between generation and treatment of municipal sewage in the country. The responsibility of treatment of sewage lies with concerned municipal authorities which may result in reduction of BOD load. Until these authorities are not able to treat the sewage to full capacity the problem of BOD can not be solved.

Q.76. What are the steps taken to control pollution in rivers?

A. The Central & State Pollution Control Board is implementing the Water Act, 1974 to restore water quality. The following main steps are taken to prevent and control pollution.

- Control of Industrial pollution under the provision of Water (Prevention and Control of Pollution), Act, 1974
- A mutually agreed time targeted programme is implemented under Corporate Responsibility on Environment Protection (CREP) with a bank guarantee on various commitments
- Special Drives undertaken for 17 categories of industries
- Action plan for Industries directly discharging into rivers and lakes
- Action plan for 24 problem areas
- Environmental auditing made mandatory
- Encouraging Common effluent treatment plants for cluster of SSI units
- Promotion of low-waste and no-waste technology

• For control of urban pollution, CPCB regularly carries out survey of water supply and wastewater generation, collection and treatment. Cities having no treatment facilities and polluting water bodies have been identified and recommended for appropriate action to respective authorities.

Q.77. What are the treatment technologies adopted for treatment of sewage in India?

A. For treatment of sewage the activated sludge process is adopted at large in India besides the oxidation/facultative ponds and upflow anaerobic sludge blanket (UASB) which are a biological treatment process based on the activated bacterial mass in the sewage. At places, the pisciculture and aquaculture is also used as a polishing process to further reduce the organic matter in the treated sewage.

Q.78. What are the water quality requirement for different uses?

A. In order for any water body satisfies different uses, it must have corresponding degree of purity. For example drinking water needs highest purity of water, whereas disposal of wastes can be done in any quality of water. From the user's point of view, the term "water quality" is defined as "those physical, chemical or biological characteristics of water by which the user evaluates the acceptability of water". For example for the sake of man's health, we require that the water supply be pure, wholesome, and potable. Similarly, for agriculture, we require that the sensitivity of different crops to dissolved minerals and other toxic material is known and either water quality for other type of crops is controlled accordingly. Textiles, paper, brewing, and dozens of other industries using water, have their specific water quality needs.

Q.79. What is the minimum flow requirement in a river (ecological water requirements)?

A. Maintaining ecological quality often requires significant amount of water to flow in a river. Each river has developed a well-established ecosystem in its course having different habitats and seasonality. All the biological processes are highly timed and spaced. To accomplish these processes, a minimum level of water is required.

Q.80. How minimum river flow is important in pollution Control?

A. In the past and even now, dilution was considered to be an acceptable "solution to pollution" and self-purifying capacity of a stream. This has been included in most of the effluent standards (Minimum National Standards, MINAS) notified under Environment (Protection) Act, 1986. It is assumed that at least ten times dilution is available in a stream where the effluent is going to be discharged as per the MINAS. Because all deleterious material is not removed in wastewater treatment, the role of dilution is very significant in protecting the health of a river. In our country, the need for fresh water is growing at a fast rate. Thus, the focus is laid on utilisation of every drop of water. This has resulted in drastic reduction in flow conditions of many rivers in the country. Reduced flow followed by increased waste load rendered many rivers almost ecologically dead. Thus, special attention is required in water resource planning.

Q.81. What are Major Water Quality Issues in India?

A. The major water quality issues in Indian context can be summarised as follows:

- Water scarcity
- Eutrophication
- Pathogenic pollution
- Oxygen depletion in rives, lakes etc
- Salinity
- Toxicity Ecological health

Q.82. How much water pollution is generated from urban sources?

A. Due to fast urbanisation, the growth in quantity of wastewater has increased manifold. In most of the urban centres due to inadequate arrangements for collection and treatment of wastewater, it is let out untreated. The wastewater is either percolates into the ground and in turn contaminates the groundwater or is discharged into the natural drainage system causing pollution in downstream areas. It is estimated that about 33000 mld of wastewater is generated in India from Class I cities and Class II towns, out of which treatment capacity is available for about 7000 mld of wastewater.

Q.83. How much pollution is generated from industrial sources?

A. The total wastewater generated from all major industrial sources is about 90,000 Mld that includes 76,500 Mld of cooling water generated from thermal power plants. Remaining 13,500 Mld of wastewater is process water.

Small scale industries contribute about 40% of this waste water. In case of large and medium industries treatment facilities are provided for almost entire wastewater. However, in case of small scale industries the control efforts are not very effective as many of these industries are located in congested residential areas, where land is not available for treatment of wastewater.

Q.84. Which are major organic pollution generating industries?

A. The major contributors of pollution in terms of organic load are distilleries followed by paper mills. A large number of paper mills are in small-scale sector. These industries do not have adequate arrangement for treatment of wastewater. Thus, create heavy pollution in many areas. The other significant contributors of organic load are sugar and engineering industries.

Q.85 Which are major chemical pollution generating industries?

A. The industries generating chemical pollution can be divided in two categories i.e. i) those which generate high TDS bearing wastes like pharmaceuticals, rayon plants, chemicals, caustic soda, soap and detergents, smelters etc. (ii) those which generates toxic wastes e.g. pesticides, smelter, inorganic chemicals, organic chemicals, steel plants, pharmaceuticals and tanneries etc. Major contributors of TDS load are distilleries followed by pharmaceuticals, textile industries and rayon plants. Major contributors of suspended solid load are thermal power plants.

[1][SCHEDULE VII]

[See Rule (3B)]

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Pollutant	Time weighted Average	Concentration of Ambient Air			
		Industrial Area	Residential Rural and other area	Sensitive area	Method of Measurement
1	2	3	4	5	6
Sulphur Dioxide SO_2	Annual Average*	80 µg/m^3	60 µg/m^3	15 µg/m^3	- Improved West and Gaeke Method - Ultraviolet fluorescence
	24 hours**	120 µg/m^3	80 µg/m^3	30 µg/m^3	
Oxides of Nitrogen as NO_2	Annual Average*	80 µg/m^3	60 µg/m^3	15 µg/m^3	- Jacab Hochheister modified (Na-Arsentire) method. - Gas Phase Chemilumine scence
	24 hours**	120 µg/m^3	80 µg/m^3	30 µg/m^3	
Suspended Particulate Matter (SPM)	Annual Average*	360 µg/m^3	140 µg/m^3	70 µg/m^3	High Volume Sampling (average flow rate not less than 1.1 m^3/minute)
	24 Hours**	500 µg/m^3	200 µg/m^3	100 µg/m^3	
Respirable Particulate Matter (Size Less than 10 µm)(RMP)	Annual Average*	120 µg/m^3	60 µg/m^3	50 µg/m^3	Respirable Particulate Matter Sampler
	24 Hours**	150 µg/m^3	100 µg/m^3	75 µg/m^3	
Lead (Pb)	Annual Average*	1.0 µg/m^3	0.75 µg/m^3	0.50 µg/m^3	AAS method After sampling. Using EPM 2000 or equivalent filter paper.
	24 Hours**	1.5 µg/m^3	1.00 µg/m^3	0.75 µg/m^3	

[1] Inserted by Rule 5 (b) of the Environment (Protection) Rules, 1996 published by G.S.R. 176 (E) dated 02.04.1996.

Carbon Monoxide	8 Hours**	5.0 mg/m^3	2.0 mg/m^3	1.0 mg/m^3	Non disbersive infrared Spectroscopy
	1 Hour	10.0 mg/m^3	4.0 mg/m^3	2.0 mg/m^3	

* Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.

** 24 hourly/ 8 hourly values shall be met 98% of the time in a year. 2% of the time, it may exceed but not on two consecutive days.

Note : 1. National Ambient Air Quality Standard : The levels of a air quality necessary with an adequate margin of safety, to protect the public health, vegetation and property.

2. Whenever and wherever two consecutive values exceeds the limit specified above for the respective category, it shall be considered adequate, reason to institute regular/ continuous monitoring and further investigations].

[File No. Q 15017/24/89(PW)]
Sd/-
N. Bagchi, Adviser

Note : The principal rules were published in the Gazette of India vide Number S.O. 844(E), dated the 19th November, 1986 and subsequently amended vide S.O. 433 (E) dated 18th April, 1987, S.O. 64 (E) dated the 18th January, 1988, S.O. 8(E) dated the 3rd January, 1989, S.O. 190 (E) dated the 15th March, 1989, G.S.R. 913 (E) dated the 24th October, 1989, S.O. 12(E), dated the 8th January, 1990, GSR 742 (E), dated 30th August, 1990, S.O. 23(E), dated the 16th January, 1991, GSR 93(E), dated the 21st February, 1991, GSR 95(E) dated the 12th February, 1992, GSR 329 (E) dated the 13th March, 1992, GSR 475(E), dated the 5th May, 1992, GSR 797 (E) dated the 1st October, 1992, GSR 386(E), dated the 28th April, 1993, GSR 422(E), dated the 19th May, 1993 and GSR 801(E) dated the 31st December, 1993.

Annexure-II

(RSPM value≥60 µg/m^3, Jan-Aug, 2008, Annual Averages of Residential Areas)

Sl. No.	City Name	RSPM value (µg/m^3; 2008, Jan to Aug.)
1	Ludhiana	251
2	Khanna	235
3	Khurja	217
4	Kanpur	210
5	Godindgarh	208
6	Firozabad	202
7	Lucknow	190
8	Agra	189
9	Chandrapur	186
10	Noida	175
11	Jodhpur	174
12	Raipur	171
13	Allahabad	170
14	Jamshedpur	170
15	Asansol	167
16	Gwalior	162
17	Alwar	159
18	Faridabad	153
19	Ranchi	152
20	Delhi	149
21	Jalandhar	145
22	Jhansi	144
23	Jabalpur	131
24	Guwahati	127
25	Kota	127
26	Dehradun	126
27	Dhanbad	124
28	Hissar	118
29	Mumbai	118
30	Hubli-Dharwad	117
31	Satna	117
32	Nagpur	115
33	Sagar	115
34	Meerut	114

35	Korba	111
36	Jaipur	109
37	Varanasi	108
38	Navi Mumbai	106
39	Vijayawada	105
40	Kolkata	104
41	Patna	104
42	Vijayvada	102
43	Angul	100
44	Nahan	99
45	Patencheru	98
46	Rourkela	98
47	Chandigarh	97
48	Naya nangal	97
49	Jamnagar	96
50	Pune	94
51	Nagda	93
52	Visakhapatnam	92
53	Rajkot	90
54	Baddi	87
55	Ramagundam	87
56	Solapur	87
57	Imphal	84
58	Kolhapur	84
59	Surat	84
60	Bhilai Nagar	83
61	Bhubaneshwer	83
62	Hyderabad	83
63	Lote	83
64	Sibsagar	83
65	Durgapur	82
66	Ahmedabad	80
67	Ankleshwar	79
68	Aurangabad	78
69	Salem	77
70	Toothukudi	77
71	Bangalore	76
72	Tezpur	74
73	Cuttack	73
74	Bhopal	70
75	Golaghat	70

76	Gulbarga	70
77	Kurnool	68
78	Ujjain	67
79	Dimapur	66
80	Rayagada	66
81	Shimla	66
82	Nashik	65
83	Behrampur	64
84	Damtal	64
85	Hailakandi	64
86	Singrauli	64
87	Dibrugarh	63
88	Parwanoo	62
89	Bongaigaon	61
90	Udaipur	60

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

Agra has been included because it is identified as polluted cities by Hon'ble Supreme Court. Data for 2008 is average of data available as on date. National Ambient Air Quality Standard for Residential Areas (Annual average) for RSPM = 60 microgramme per cubic metre. The order of cities is tentative as it is based on data available as on date.