

PRESENTATION ON

LABORATORY ACTIVITIES

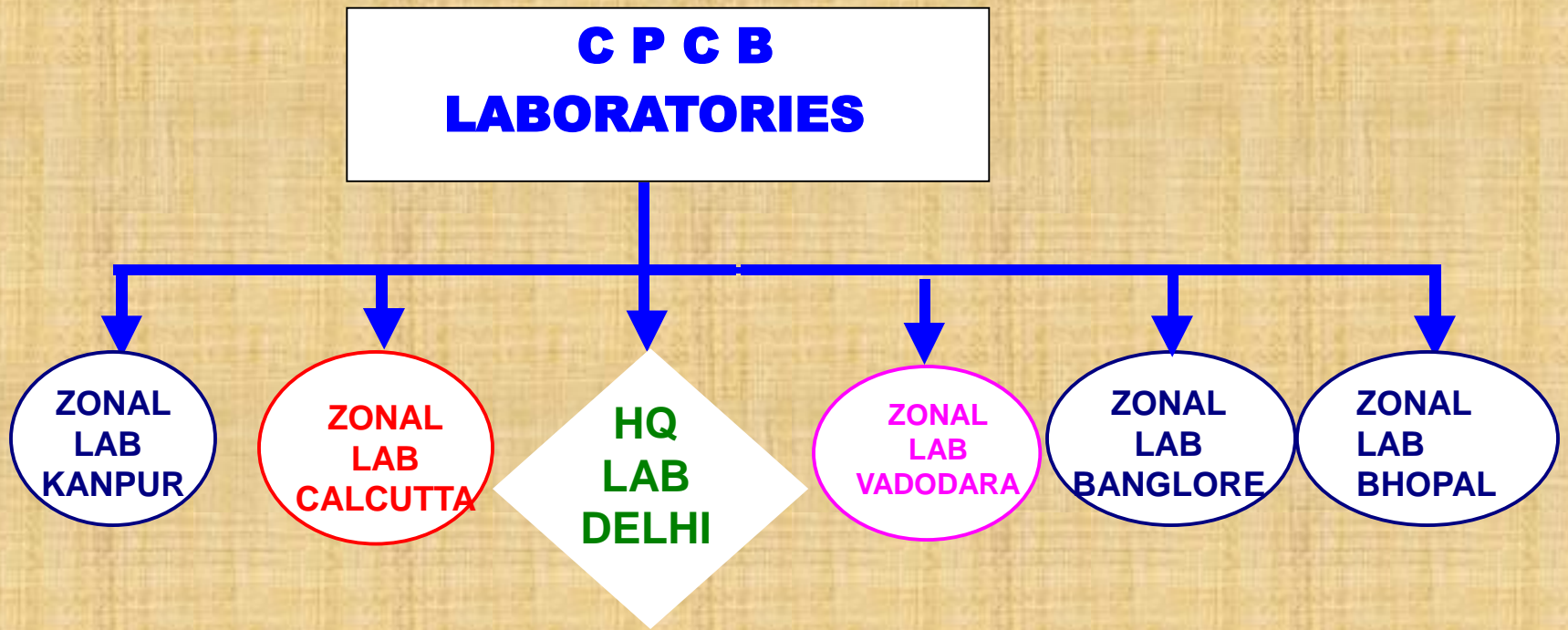
OF

CENTRAL POLLUTION CONTROL BOARD

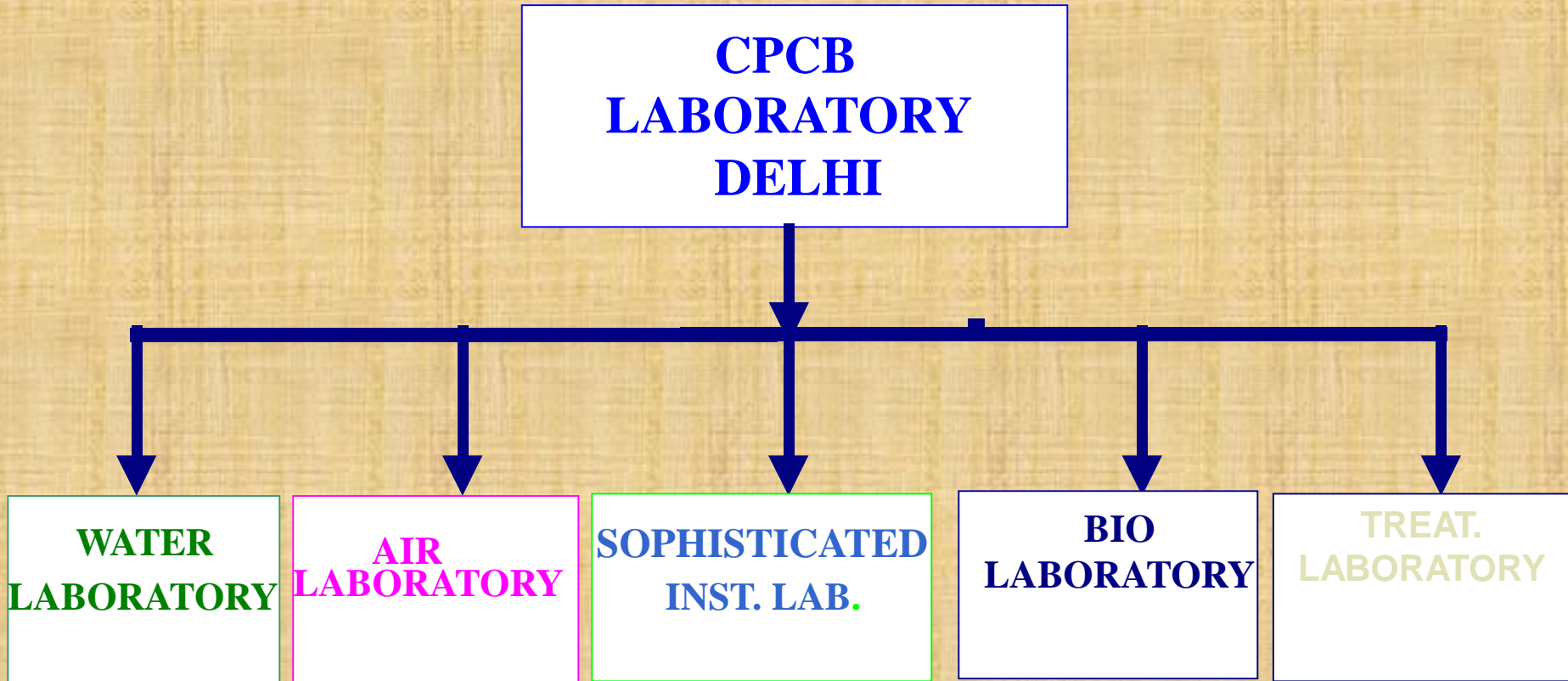
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**STRUCTURE OF CENTRAL POLLUTION CONTROL BOARD'S
HEAD & ZONAL LABORATORIES**



STRUCTURE OF CENTRAL POLLUTION CONTROL BOARD'S

LABORATORIES : CENTRAL H.Q. LAB.

Central Pollution Control Board – Delhi

Laboratory Division

The Main objectives of the Laboratories are:

1. Analysis of various parameters for routine and specific monitoring activities
2. Supporting services of various schemes with regard to sampling and analysis
3. Carry out Research Project studies
4. Standardization of new methodology for analysis of specific pollutants
5. Carry out bilateral collaborative project studies with other countries.
6. Collection of technical literature and specifications of various instruments and equipments.
7. Providing scientific training and laboratory related services to state pollution control board and other related organization.
8. Conducting Analytical Quality Control (AQC) Exercises for Central and Regional Laboratories of State Pollution Control Boards.
9. Carryout collaborative project studies with other institutes
10. Providing scientific related services for the purpose of Mass Awareness

Provision of the environmental laboratories and analysts under the various environmental legislations

The Water (Prevention and Control of Pollution Act), 1974

- Under Section 16(3) – Central and Section 17(2) – State Pollution Control Boards laboratories are established
- Establish or recognize a laboratory (s) for performing the analysis of water and wastewater samples.
- The laboratory is named as Board's laboratory and samples are analyzed by the Board's analyst appointed under Section 26 of The Water Rule, 1975 by Govt. Notification.
- Under Section 51 – Central Water Laboratory
- Under Section 52 – State Water Laboratory
- Under Section 53 (1), (2) & (3) – Govt. analysts are notified
- Qualification:
 - Boards analyst or Government analysts – Master Degree in Science (Chemistry) or equivalent or Bachelors degree in chemical Engineering or Bio-chemical Engineering with 10 years of experience in analysis of water or industrial wastes

The Air (Prevention and Control of Pollution) Act, 1981

- Under Section 16(3) – Central and 17(2) – State Pollution Control Board Laboratories are established or recognized for carrying out the analysis of air samples.
- Board analysts having the prescribed qualification and experience (Second class Master Degree in Basic Science or life science and 3 years experience in environmental quality management) are appointed and notified through Govt.notification under section 29 (2).
- Under Section 28, Central and State Govt. may establish or specify one or more laboratories as State Air Laboratory.
- Under Section 29(1) – Govt. analysts

Environment (Protection) Act, 1986

- Under Section 12, the Central Govt. – establish or recognize environmental laboratories
- Under section 13, the Central Government – appoint or recognize Government analysts
- The Government analyst should possess the prescribed qualification and experience as specified under Section 10 of The Environment (Protection) Rules 1986. (Graduate in Science in Science with 5 years or Post graduate with 2 year of experience in the relevant field).

Function of the Environmental Laboratories under Water and Air Act

- **Quality Assessment of Environmental Water and Ambient Air.**

- * Under Section 16(2) (f) and 17(1) © of the Water Act require the Central and State Pollution Control Boards, respectively, to collect compile and disseminate information relating to water pollution and similarly, under section 16(2) (g) and 17(1) (c), dissemination of information relating to Air Pollution is required.

- * One of the main objective of the Acts is to maintain or restore wholesomeness of water bodies and to prevent, control and abate air pollution.

- * To meet this objective, the environmental laboratories of the pollution control boards are required to have adequate facilities to assess the quality of water and air.

Functions under Environmental Protection Act

Characterization of Hazardous waste

- * The environmental Laboratories and Government analysts recognized under Environment (Protection) Act, 1986 are required to characterize the industrial wastes or any other waste substances to check if they fall under the category of hazardous wastes.

Landfill site – Selection and Assessment

- * One of the functions of the environmental laboratory is to conduct studies on suitability of a site for hazardous waste landfill sites in context of the authorization issued under the Act and to determine when a landfill site is to be abandoned to continue the monitoring of the abandoned site and initiate action for remediation.

Compliance check on incinerators and other treatment

- * Environmental laboratories are required to monitor the emissions from incinerators of hazardous waste and discharges from the effluent treatment plant to ensure the compliance of the prescribed standards.

Research and Development

Under section 16(1) (c) and 17(1) (b) is to carry out the investigation and research relating problems of water pollution and abatement. Further Section 17(1)(h) provides for development of economical and reliable methods of treatment of sewage and industrial effluents taking into account low river flow conditions, climate, soil conditions etc. Some of the important areas of Research and Development are, simple and quicker methods of analysis, bio-monitoring, methods of carrying capacity studies, Environmental Impact Assessment, cleaner technology/ production, reuse, recycle and minimization of wastes etc.

LABORATORY RECOGNITION:

Recognised as Central Water & Air Laboratories under the MOEF notification number 787(E) since Nov.19th, 1991 under The Water Act(1974) & The Air act(1981)

Recognised as Environmental Laboratory under The Environment (protection) Act, 1986 (29 of 1986) since July 21st ,1987.

LABORATORY ACCREDITATION

CPCB has applied for ISO/IEC 17025 (1999) for Laboratory Accreditation through NABL, DST.

Necessary steps for system implementation and documentation have been completed. Final assessment is expected shortly.

CENTRAL POLLUTION CONTROL BOARD

List of main instruments/equipment available in laboratories

S.No	NAME OF THE INSTRUMENTS/EQUIPMENT
01.	Analytical balances
02.	AOX analyser
03.	Atomic Absorption Spectrophotometer (AAS)
04.	Auto Titration units
05.	Benzene Monitoring System
06.	Bacteriological Kit (field)
07.	Centrifuge
08.	CO/HC analyser
09.	COD digestion system
10.	Conductivity meter
11.	Dispensers
12.	Dissolved Oxygen meter
13.	Gas Chromatography (GC)
14.	Gas Chromatography (portable) for BTX Measurement
15.	Gas analysers(SO ₂ , NO ₂ , CO, Ozone, VOC, etc.)
16.	Handy Sampler
17.	High Volume Sampler
18.	High performance Liquid Chromatography (HPLC)

19. Ion meters
20. Ion-Chromatography
21. Low Volume Sampler
22. Mercury Analyser
23. Microscope (inverted)
24. Microscope (Research)
25. Microwave digester
26. Noise level meter
27. Ozone analyser
28. pH meter
29. Respirable Dust Sampler/ PM 10 sampler
30. Smoke Density meter
31. SODAR system
32. Spectrofluorimeter
33. Static Injection System for Air Quality assurance system
34. TOC analyser
35. TCLP Hazardous waste Extraction system
36. UV – Visible Spectrophotometer
37. Visible Spectrophotometer
38. Water Purification
39. Water purification system with nanopure

LABORATORY SCIENTIFIC ACTIVITIES

Laboratories are established under the provisions of The Water Act (1974), Air Act (1981) and EP Act (1986)

Major scientific laboratory activities include:

- 1. Carryout Work related to development of Environmental standards**
- 2. Carry out Research and Development Project studies**
- 3. Development and standardization of new methodology for analysis of specific pollutants**
- 4. Conducting Analytical Quality Control (AQC) Exercises for laboratories of Pollution Control Boards and other organisations (water & Air)**
- 5. Providing scientific and laboratory related services to State Pollution Control Boards, MoEF, DST, IIT, Schools, colleges and other organisations**
- 6. Preparation of technical specifications for the analytical instruments**
- 7. Preparation of user friendly analytical manuals**
- 8. Inspection of laboratories for grant of recognition under various environmental acts**
- 9. Carryout bilateral collaborative project studies with other countries**
- 10. Providing laboratory analytical training to pollution control boards, industries, students, NGOs and other organisations**
- 11. To act as a guide / co guide for the PhD thesis or project dissertations for post graduate degrees in universities for the environmental related studies**

SOME IMPORTANT R & D PROJECT STUDIES

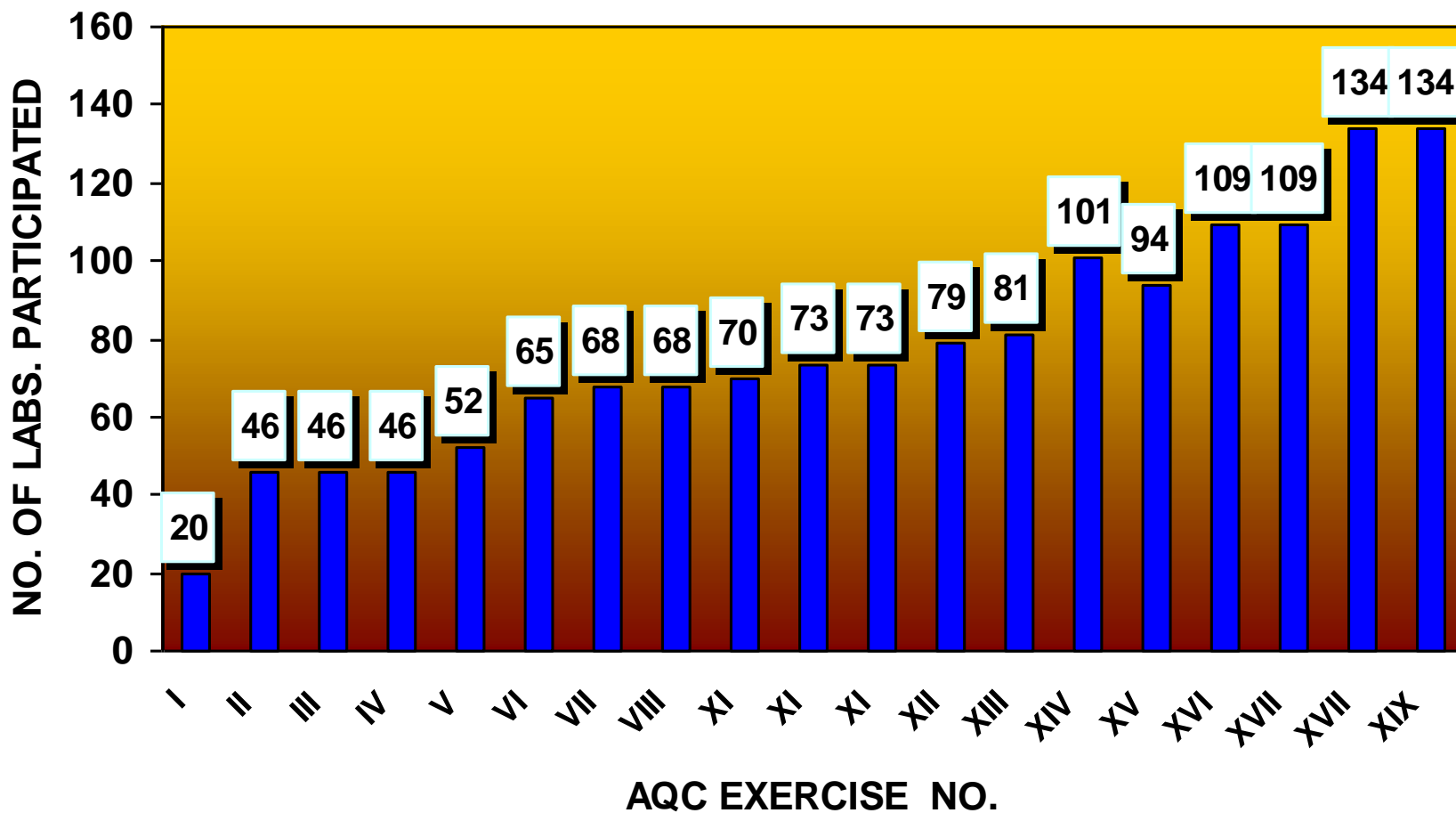
(completed / ongoing)

1. BOD test determination at 27° c for 3 days for tropical countries like India as against standard condition of 20 ° c for 5 days (validated with 13,000 samples tested in 12 laboratories with 25 types of effluents / water – Accepted as BIS standard method)
2. BODSEED, a microbial mixture, an alternative to conventional sewage seed in BOD determination (validated in 6 laboratories, Technology transferred, available commercially)
3. BOD BEADS – Improved and reusable version of BODSEED (Patented)
4. Testing and validation of immobilized microbial membrane for development of BOD biosensor for rapid BOD determination (MoEF sponsored project)
5. Technological development of specific microbial packages for treatment of paper and pulp industrial wastewaters (sponsored by DBT)
6. Studies on Correlation of COD, BOD and TOC for industrial and domestic wastewater [to replace COD (4hrs test) and BOD (3days test) by TOC (few minutes)]
7. Analytical Quality Control (AQC/water) for the laboratories of SPCB, NRCD project laboratories EPA Recognised Laboratories, Hydrology Project Laboratories etc. (20 parameters, around 150 labs in 2000)

8. Development and implementation of Biomonitoring techniques for assessment of water quality of river and lakes (simple and inexpensive technique useful to NGOs, schools, colleges and non-technical people)
9. Developed and distributed around 600 Water Testing Kits (WTK) to NGOs, schools, colleges, Panchyats, Nagar palikas and other organizations (20 parameters can be analysed, cost Rs. 2000/-)
10. Development of Fluoride Testing kit (FTK) for UNICEF
11. Development and testing of Sludge Reagent Product (SRP), an Innovative Process for Water and Waste Water Treatment (study completed for water treatment, patent being filed)- [Saving of Alum consumption in Waterworks about 90 %, continuous reuse of sludge, reduced sludge production and dumping of aluminium in the environment about 85 to 90%]
12. Development of analytical methodology and standards in terms of dimensionless toxicity factor (TF) for industrial effluents (Method developed and accepted as BIS method, standard developed for pesticide effluent, study completed for Pharmaceutic and dye & dye intermediate; Study for textile industry is in progress (NEERI, NIOH and Gujarat Board are participating with CPCB).

(Projects at Sl. No. 2 to 4 in collaboration with Center for Biochemical Technology, CSIR, Delhi)

GROWTH OF AQC /WATER PROGRAMME (1991 to 2002)



LIST OF PARAMETERS IN AQC

S.No	Parameter	S.No	Parameter
1	Conductivity	11	Sulphate
2	TDS	12	Nitrate-N
3	FDS	13	Ammonia-N
4	Total Hardness	14	TKN
5	Calcium	15	Phosphate-P
6	Magnesium	16	Boron
7	Sodium	17	Chromium ⁺⁶
8	Potassium	18	COD
9	Chloride	19	BOD
10	Fluoride	20	TSS

CENTRAL POLLUTION CONTROL BOARD

List of sponsored ongoing Scientific/R & D project studies

1. Monitoring of Yamuna River for Assessment of Water Quality (Sponsored by NRCD, MoEF).
2. Performance studies of Sewage Treatment Plants (STP) in Delhi, Faridabad, Gurgaon and Ballabgarh constructed under Yamuna Action Plan (Sponsored by NRCD, MoEF).
3. Performance of STPs along the Ganga River (Sponsored by NRCD, MoEF).
4. Analytical Quality Control (AQC/water) for the laboratories of Hydrology Project, an Indo-Nether project (Sponsored by Hydrology Project).
5. Development of Certified Reference Materials (CRMS) of toxic metals in industrial effluent (sponsored by DST).
6. National task for Development of Reference Materials- Co-ordination activities- (sponsored by DST).
7. Development of Fluoride Testing Kit for UNICEF (Sponsored By UNICEF).
8. Development of Certified Reference Materials (CRMS) of gas mixtures for the first time in the country (sponsored by DST).
9. Performance Evaluation of 9 Sewage Treatment Plants (STP) located in Delhi (sponsored by Delhi Jal Board).
10. Performance Evaluation of Sewage Treatment Plants (STP) located in Noida & Mathura (sponsored by U.P. Jal Nigam).
11. Technological development of specific microbial packages for treatment of paper and pulp industrial wastewaters (sponsored by DBT).

AIR LABORATORY

1. Operation and maintenance of continuous water quality monitoring stations in Delhi (On-going)
2. Operation and maintenance of continuous of air quality monitoring stations in Delhi (including BTX and PAH monitoring in Delhi and Benzene in Delhi and Kanpur using passive sampling) (on going)
3. Quality assurance in air quality measurements (on going)
4. Polynuclear aromatic hydro-carbon: sampling and analysis in Delhi (on going)
5. Standardization of methodology for sampling (active & passive) and analysis of Benzene using GC_MS ATDGC & GC_FID (on going)
6. Monitoring of benzene in Delhi (on going)
7. Assessment of noise level in Delhi (on going)
8. Inspection of Authorized Pollution checking centres in Delhi (on going)
9. Air quality assessment in different areas including traffic intersections in Delhi using mobile van (on going)
10. Studies on spatial and temporal distribution of ambient Ozone in Delhi metropolitan area (On going)
11. Development & strengthening of monitoring of ambient PM_{2.5} at Delhi
12. Up gradation of SODAR System with Computer & software
13. Standardization of Methods for measurement of CS₂ & H₂S in Source emission (NEW)
14. NPL Research Projects (On-going)
15. Manual monitoring of ambient air quality in 5 Zonal offices (each one location) and HO for reporting in television.
16. Up gradation of 6 NAMP stations & ITO station in Delhi
17. Renovation/ re-fabrication of existing continuous air quality monitoring system (Fixed & Mobile) in Delhi
18. Development of certified reference material (CRM) of air mixture (On-going)
19. Strengthening of Monitoring Network – Male Declaration on Prevention and Control of Air pollution and it's likely Tran boundary effects for South Asia

WATER LABORATORY

20. Analytical quality control (AQC/ Water) for Central and State Pollution Control Boards, Pollution Control Committees & for laboratories recognized under E.P.Act (on going)
21. Testing and validation of BOD Biosensor based on microbial mixed culture for rapid BOD determination in wastewater in collaboration with CBT, CSIR, Delhi (On-going)
22. Development & standardization of soil and solid waste analysis for Analytical Quality Control
23. Monitoring of ground water quality around solid waste disposal sites in Delhi
24. A comparative studies on Methodology of Analysis and Characterization of Hazardous Wastes
25. Ground Water Quality Monitoring of Problem area: Najafgarh Drain Basin area, Delhi (NEW)
26. Technology development of specific microbial packages for treatment of paper & pulp industrial waste water
27. Development of Certified Reference Materials (CRM) of Toxic metals in Industrial effluent
28. Development and Distribution Water testing kits (WTK)

BIO-SCIENCE LABORATORY

29. Bio monitoring of rivers/ lakes for assessment of water quality (On-going)
30. Water quality assessment through bio-monitoring of major wetlands in Wild life habitats of India
31. Development of toxicity based standard for industrial effluents-textiles (On-going)
32. Efficiency testing of autoclaves used for hospital waste treatment by spore testing method (on going)
33. Bio-Mapping of some perennial rivers of Meghalaya in Collaboration with Meghalaya SPCBd (Mew)
34. Phyto-remidiation of particulate matter for ambient environment through dust capturing plant species
35. Development of microbial standard for disposal of Urban wastewater
36. Water Quality Monitoring of River Yamuna(Ongoing)
37. Performance study of sewage treatment plants in Delhi & Haryana under Yamuna Action Plan(Ongoing)
38. Performance Monitoring of Oxidation Pond based Sewage Treatment Plants in U.P under Yamuna Action Plan(New)

TREATABILITY LABORATORY

39. Air micro flora monitoring in Delhi
40. Sludge reagent product (SRP) – an innovative process for water and waste water treatment- flocculation study- setting up of pilot study plant (on going)
41. Enzymatic Removal of trace aromatic compounds from Drinking water by immobilized Peroxidases
42. Removal of Toxicity from Industrial wastewater using selective chemical treatment methods (Ozone, Hydrogen peroxide, Fenton reagent etc.)
43. Standardization of methodology for measurement of certain hazardous organic compounds (PCBs) (on going)
44. Development of metal Reference standards (On-going)
45. Development and Standardization of methodology for measurement of Trihalomethanes (THMs)) in drinking water
46. Characterization of industrial effluents for absorbable organic halides (AOX) in selected industries (On-going)
47. Geo-accumulation and Bio-accumulation of Heavy metals and pesticides on soil and crop vegetation during wastewater irrigation
48. Studies on Compost quality and it's application in Agriculture(in collaboration with IARI, New Delhi)

INFRASTRUCTURE –LABORATORIES: GENERAL

49. World Bank Project: Performance Audit on the utility of instruments/ equipment supplied under Industrial Pollution Control (IPC) World Bank project including Service activities (New)
50. Calibration of Instruments under NABL Programme (New)
51. NABL – Laboratory Accreditation activities (On going)
52. Eco-Mark scheme
53. Up gradation of laboratories (on going)
54. Procurement of instruments, equipment and spare parts
55. Maintenance of laboratories (electricity, water, telephone, fax, repair & services etc.)
56. Indo – GTZ projects: service activities

CENTRAL POLLUTION CONTROL BOARD PATENTS OBTAINED

(Jointly with Centre for Biochemical Technology, CSIR, Delhi)

- 1. BODSEED Patent: "A process for the preparation of a microbial composition useful for reproducible BOD estimation"
Patent No.: 343/DEL/94. Accepted for Publication in 1998**

The BODSEED has been patented during 1998 in the above title and transfer of technology has been made through BCIL, N.Delhi to M/S Indo Bioactive labs (P) Ltd., Pune

- 2. A Reusable immobilized Microbial Composition useful as Ready-to-Use Seed Inoculum in BOD Analysis
Granted in USA Patent No. 5952,188, 1999**

- 3. A process for the Neutralization of Alkaline wastewater by using package of Alkalophilic Bacteria
Patent No. 1518/DEL/94, 1994 Accepted for publication in 1998**

PATENTS APPLIED

(Jointly with Centre for Biochemical technology, CSIR, Delhi)

1. **A Reusable immobilized Microbial Composition useful as Ready-to-Use Seed Inoculum in BOD Analysis**

Filed in UK, Patent No. 9813305.1, June, 1998

2. **A Microbial Composition and a Process useful for the Neutralization of alkaline Waste-Waters.**

Filed in USA, Patent No. 09/160422, 1998

3. **A Microbial Composition and a Process useful for the Neutralization of alkaline Waste-Waters.**

Filed in UK, Patent No. 9823332.3, 1998

4. **An Immobilized Microbial Consortium useful for Rapid and Reliable BOD estimation**

Filed in USA in 2000: Patent No. 09/557,440

5. **An Immobilized Microbial Consortium useful for Rapid and Reliable BOD estimation**

Filed in UK, 2000

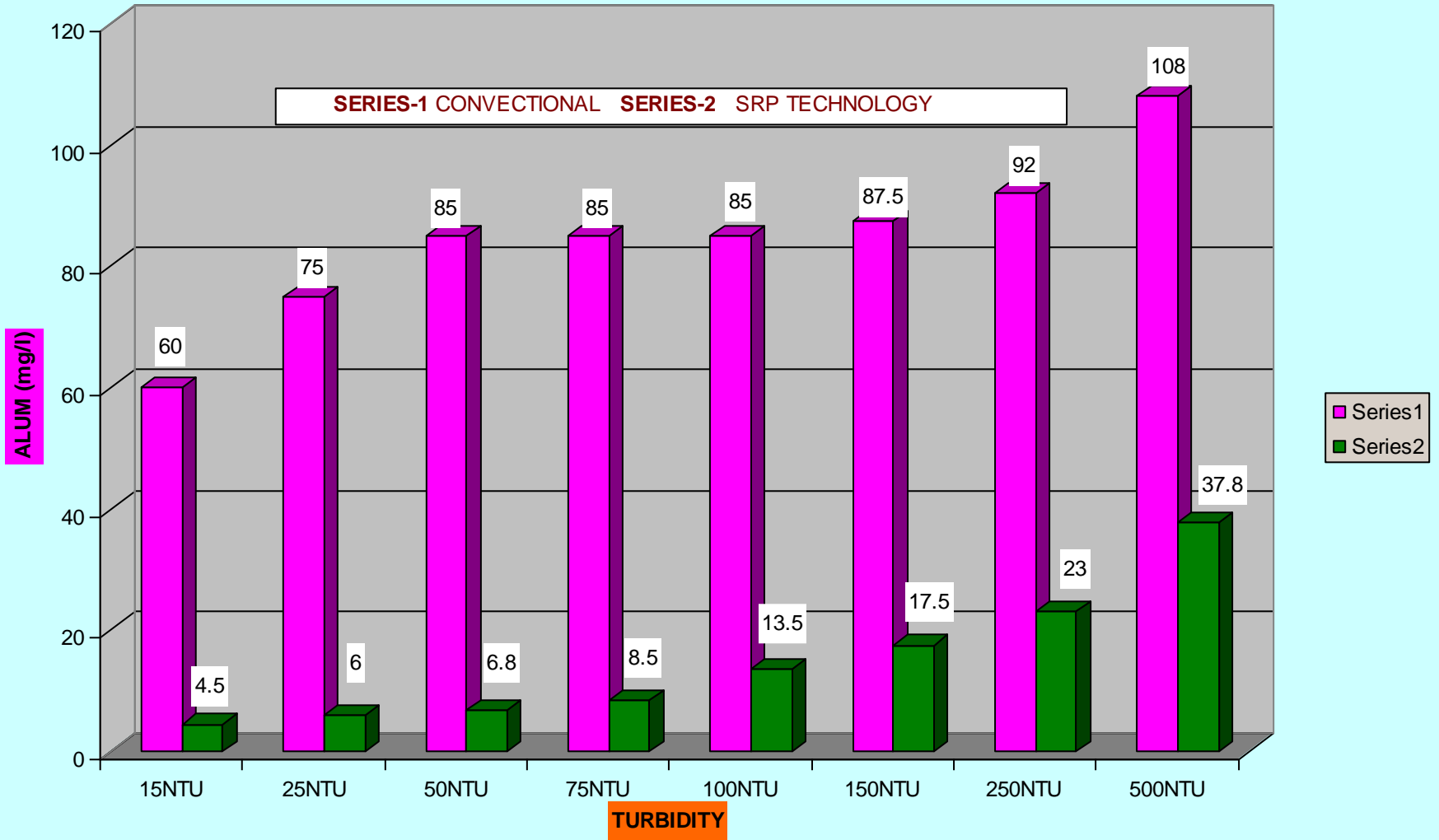
6. **Process for the preparation of an immobilized Microbial Consortium Useful for Rapid and Reliable BOD Estimation.**

Patent filed in India, 2000, NF/119/2000

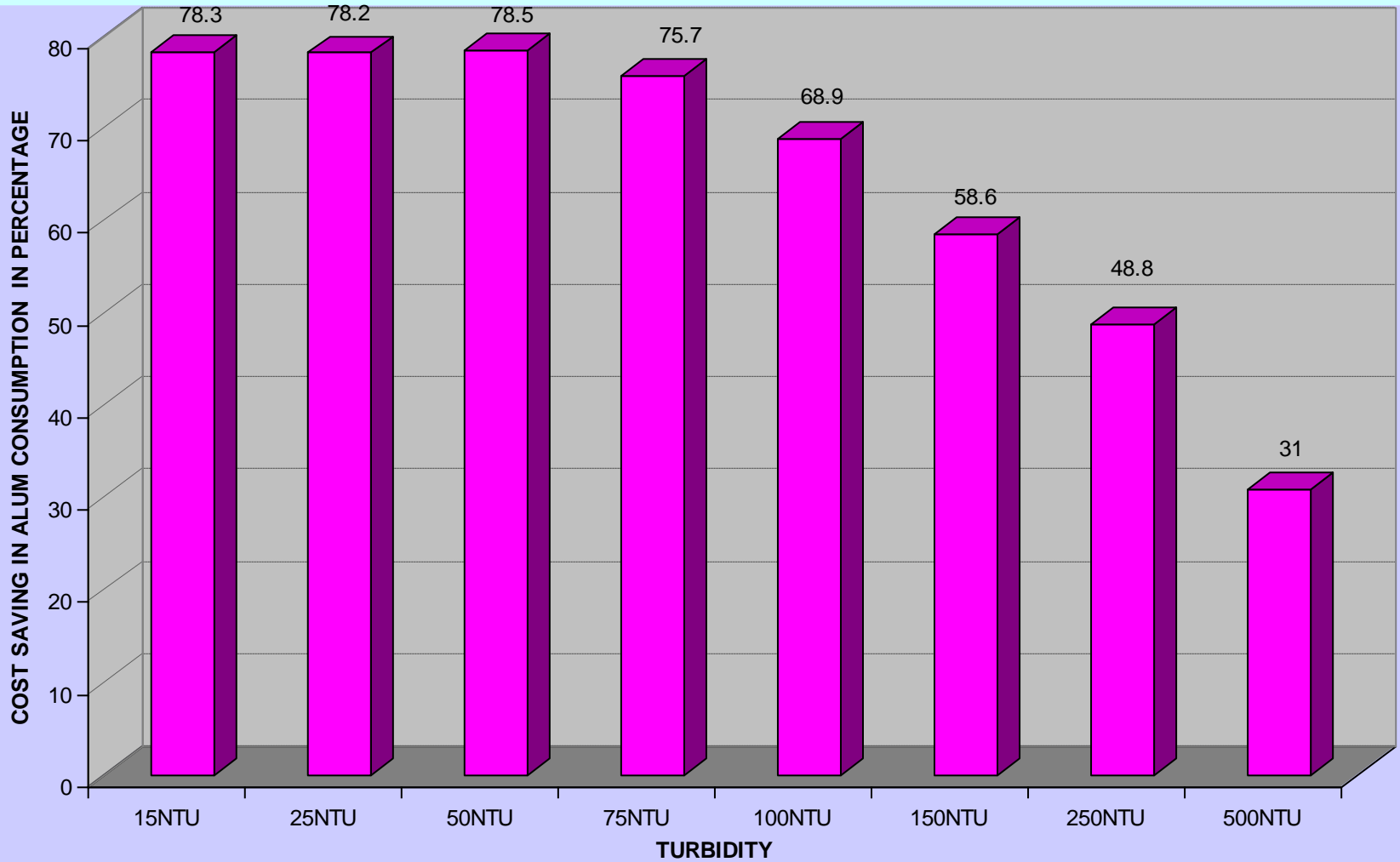
7. **Treatment of Water With SRP Technology**

Patent filed in India, 2001

ALUM REQUIRED IN CONVENTIONAL / SRP TECHNOLOGY TO TREAT YAMUNA RIVER WATER AT DIFFERENT TURBIDITY



COST-EFFECTIVENESS OF SRP(L) TECHNOLOGY IN TREATING YAMUNA RIVER WATER AT DIFFERENT TURBIDITY





WATER TESTING KIT

(developed by CPCB in 1995)

LIST OF PARAMETERS IN WATER TESTING KIT

S.N	Parameter	S.N	Parameter
0		0	
1	Colour	12	Chloride
2	Odour	13	Fluoride
3	Temperature	14	Nitrate-N
4	Turbidity	15	Ammonia-N
5	Suspended Solids	16	Phosphate-P
6	pH	17	Sulphate
7	Alkalinity	18	Iron
8	Dissolved Oxygen	19	Residual Chlorine
9	Total Hardness	20	Total Coliform
10	Calcium	21	Primary Productivity
11	Magnesium		

COLLABORATIVE PROJECTS WITH VARIOUS ORGANIZATIONS / INSTITUTIONS

S.No	Name of Organization / institution	No. of Projects
01.	World Bank	04
02.	GTZ, Indo-German Project	08
03.	UNEP	01
04.	UNICEF	01
05.	NEERI, NAGPUR	11
06.	IITs	04
07.	Dept. of Ocean Development	01
08.	EPTRI, Hyderabad	08
09.	Anna University, Chennai	01
10.	PCRI, Hardwar	02
11.	Sulabh International, Delhi	01
12.	Jadavpur University, Calcutta	01
13.	Indian Agricultural Research Institute, Delhi	01
14.	National Physical Lab., Delhi	04
15.	CBT, CSIR, Delhi	04
16.	National Remote Sensing Agency, Hyderabad	01
17.	National Atlas & Thematic Mapping Organisation, Calcutta	02
18.	West Bengal State Council of Science & Technology, Calcutta	03
19.	National Chemical Lab., Pune	05
20.	CLRI, Chennai	02
	Total Projects	65

CENTRAL POLLUTION CONTROL BOARD

Scientific & Technical ACTIVITIES

SYNOPSIS

S.No.	Title	Nos.
01.	Total No. of laboratory Scientific projects carried out in last 5 years	51
02.	No. Of ongoing sponsored projects	09
03.	No. of patents obtained	03
04.	No. of patents applied	06
05.	Industry specific standards developed	70
06.	No. of collaborative projects with various organizations/institutions	65
07.	No. of Research papers published by CPCB officials	697
08.	Total No. of technical publications made by CPCB	269
09.	No. of scientific and technical training imparted by CPCB	220
10.	No. of technologies developed for pollution prevention and control	23
11.	No. of Environmental planning studies / mapping conducted in last 5 years	90
12.	No. of books available in library	7560
13.	No. of Journal subscribed / received	50

THANK YOU