13.0

Development In CPCB Laboratories

13.1 Analytical Quality Control (AQC- Water) Exercise for Environmental Laboratories

CPCB is conducting regular and organised Analytical Quality Control (AQC) for about 150 Laboratories

Environmental measurements and subsequent data generation should be of high quality in order to take good and correct decision for environmental management. Analytical Quality Control (AQC) is one of the main tools by which the performance of a laboratory can be assessed in terms of accuracy and reliability of analytical data generated by the laboratory. The CPCB is monitoring 1019 water quality monitoring stations under GEMS, MINARS, GAP and YAP programmes comprising rivers, lakes, wells, and groundwater spread over 27states and 6 UTs through various SPCBs. In order to obtain reliable and accurate analytical data, CPCB is conducting regular and organized AQC exercise for about 150 laboratories of SPCBs/PCCs and laboratories recognized under Environment (Protection) Act, 1986. This exercise was started in 1991 with 20 laboratories and as in 2007, 150 laboratories are under this project. Twenty third round of exercise was conducted and performance reports were communicated to the participating laboratories. There are 30 phsico-chemical parameters including heavy metals are covered under this scheme. The performance of the laboratories in the 23rd Exercise for physico- chemical and metal parameters varied from 58.3 to 80.6% and

Figure 13.1a Performance of Labs in 22nd AQC exercise (General Parametres)

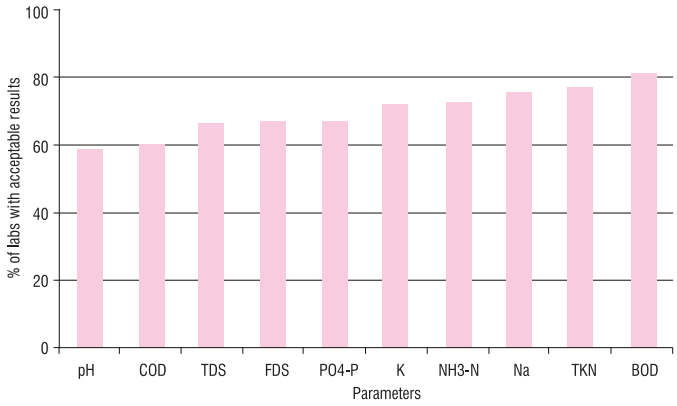


Figure 13.1b Performance of Labs in 22nd AQC exercise (Metals)

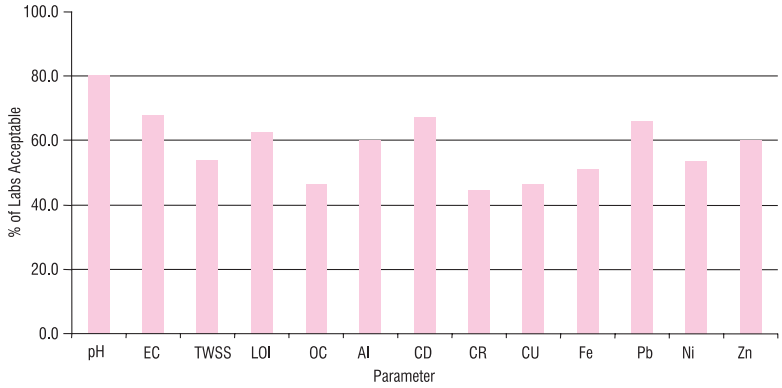
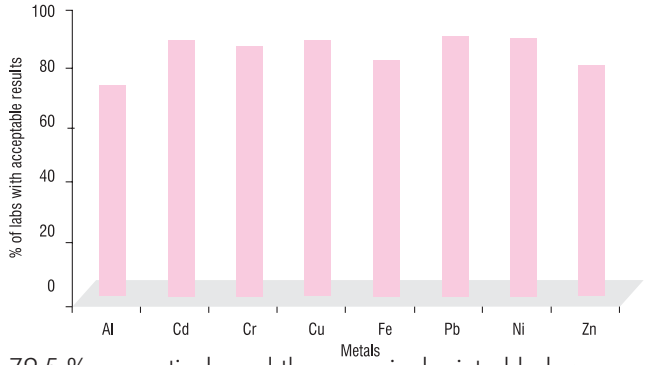


Figure 13.1c Performance of Labs in 22nd AQC exercise (Metals)



69.7 to 79.5 % respectively and the same is depicted below.

13.2 Development of Standardization of Soil and Solid Waste Analysis Method

The Municipal Solid wastes (Management and Handling) Rules, 2000 and also The Hazardous Waste (Management and Handling) Rules, 2003 (Amendment) notified under the Environment (protection) Act, 1986 require to carry out analysis and characterization of the solid wastes. A project was taken up to standardize the analysis of soil (polluted) and solid waste with a focus on conducting AQC exercises to the laboratories of SPCB/PCC. The data generated during the 1st round of AQC for MSW compost waste and

Figure 13.2a AQC Exercise Results (MSW Samples) - General Parametres

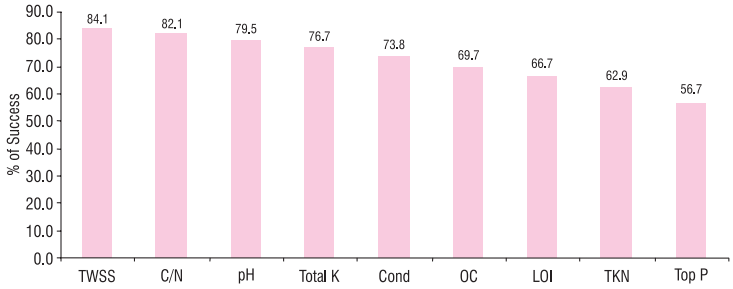
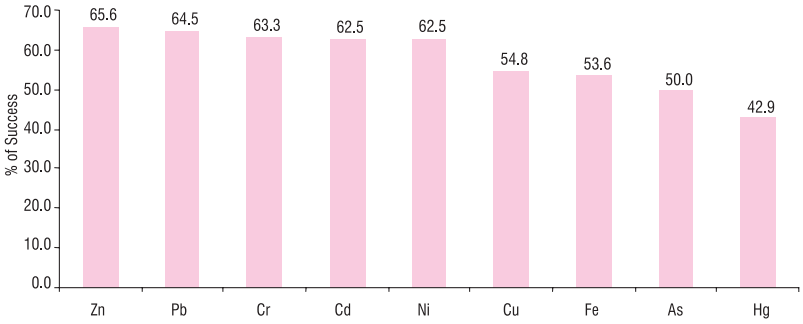


Figure 13.2b AQC Exercise Results (MSW Samples) - Metals



CPCB laboratory has obtained Laboratory Accreditation through National Accreditation Board for Testing and Calibration Laboratories, DST, as per ISO 17025

during 2nd round for CETP waste are presented below.

13.3 Participation of CPCB Laboratories in International Proficiency Testing Programme

The CPCB laboratory has obtained laboratory cccreditation through National Accreditation Board for testing and calibration laboratories (NABL), Department of Science and Technology as per ISO 17025. The accreditation covered 85 chemical and 6 biological parameters.

As per the requirements of NABL Laboratory Accreditation system (ISO – 17025) the laboratory has to participate in Proficiency Testing (PT) programme for the parameters covered under scope. During 2007, CPCB Laboratory has participated in two international PT programmes conducted by State Department of Health, New York, USA and qualified for various physico-chemical parameters viz. Alkalinity, Ammonia-N, BOD, Calcium Hardness, Chloride, COD, Conductivity, Cyanide, Fluoride, Magnesium, Nitrate-N, Nitrite-N, Oil and grease, Orthophosphate-P, pH, Phosphate P, Potassium, Sodium, Sulphate, Total Dissolved Solids, Total Organic Carbon, Total solids, Total Suspended Solids, Various Metals, Pesticides, PCB's, Trihalomethanes etc.

13.4 Trace Element Analysis of Air Particulates through Energy Dispersive X-Ray Flouresence (ED-XRF) Spectrophotometer

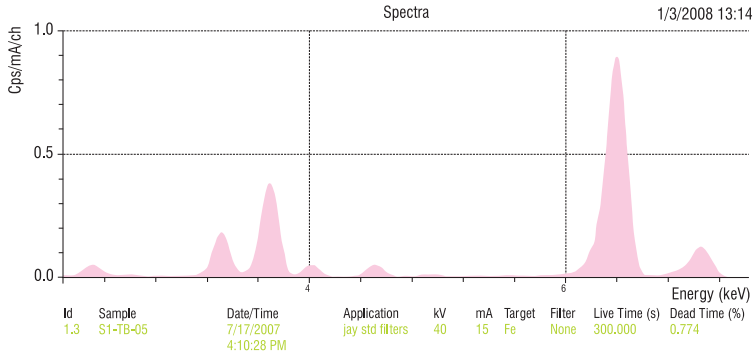
Energy Dispersive X-Ray Fluorescence (ED-XRF) Spectrometer has been commissioned at Instrumentation Laboratory of CPCB, Delhi on 7th January, 2007. The highly sophisticated instrument is the first of its kind in this country with application for non-destructive analytical technique for analysis of the PM10 and PM2.5 fractions of Suspended Particulate Matter (SPM) of ambient air for different elements from Sodium (Na) to Uranium (U) (78 elements) except inert gases.

The particles of aerodynamic diameter of <10 and 2.5 < μm (ie. PM10 and PM2.5) can be inhaled in to the respiratory system, which have adverse effects on health. The measurement of the elemental composition of the particulate matter is a key factor in understanding the long term health effects. The trace elemental analysis of air filter was set up according to EPA method IO-3.3. The instrument has been calibrated

with 42 air filter standards procured from Micromatter Co., USA. The instrument software features a very powerful deconvolution algorithm, which analyzes the sample spectrum and determines the net intensities of element peaks, even when they overlap one another. The extremely low background is a consequence of 3-dimensional optical path.

The trace elements that could be analyzed in Ambient Air Particulate samples through EDXRF are Na, Mg, Al, Si, P, S, Cl, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Rb, Sr, Y, Mo, Rh, Pd, Ag, Cd, Sn, Sb, Te, I, Cs, Ba, La, W, Au and Pb. More than 659 ambient air filter samples of source apportionment study project have been analysed during the year for multi elements using EDXRF during the year.

Figure 13.4 Performance of Labs in 23rd AQC exercise (Metals)



13.5 Development and Standardization of Methodology for Sampling and Analysis of Hazardous Organic Compounds - Dioxins (PCDDs) and Furans (PCDFs)

The CPCB developed Infrastructure facilities for measurement of Dioxins & Furans in source emission, ambient air, industrial bye-products, process waste, treatment waste and biological samples significant for bio-accumulation study and in any other matrices. The exhaustive facilities for indirect assessment of dioxin / furan levels and exposure have been developed at National Reference Trace Organics Laboratory. The following activities have been undertaken during the year.

- High Resolution Gas Chromatograph - High resolution mass spectrometer had been installed during April, 2007. Mass resolution was optimized, multi-level calibration was performed and performance of system was evaluated statistically.
- Dioxin Source Emission Sampling Kit procured along with HRGC-HRMS JEOL 800D. Another Isokinetic Stack Emission Sampling assembly was also procured from Westech Instruments, U.K.
- Short term consultant Dr. Werner Butte of Oldenburg, Germany was invited to evaluate preparedness for Dioxin & Furan analysis, suggested scope of improvements. Practice with source emission sampling kit (in the Laboratory. as well as a mock sampling for Dioxin and Furan has

been undertaken at Rajghat Thermal Power Station, Delhi).

- PM2.5 sampler with PUF and PUF high volume sampler for vapour phase sampling of Dioxin-Furan in ambient air have been procured.
- Four sets of six port nitrogen blowing units were procured and installed for final concentration of extracts after all cleanup steps.
- Procurement of glass cartridges for XAD resin for use in source emission sampling and Poly Urethane Foam for use in ambient air sampling.
- Procurement of circulating water chiller for use with Soxhlet Apparatus- is under process.
- Procurement of activated charcoal (Carbopack Carbon), cesium hydroxide, sodium sulphate, anhydrous, glasswool and glass capillaries for extract cleanup and transfer.
- Procurement of special amber glass vials with open top screw caps and Teflon lined (each side) septa is under progress.
- Procurement of multi-level calibration standards of 17 congeners of dioxin furan with 13C12 isotope labeled internal standards, sampling spike, extraction spike and syringe spike standards identified and under procurement.
- Further development of infrastructure in progress. The optimization/ validation of standard methodology for sampling, extraction, various applicable cleanup chromatography and analysis by HRMS followed by evaluation of quality control parameters will be undertaken in the first quarter of 2008.

ED-XRF Spectrometer has been commissioned at Central Pollution Control Board Laboratory

13.6 Auditing of Authorised Pollution Checking Centres in Delhi

The CPCB is regularly inspecting the pollution checking centers, authorized by Directorate of Transport (Govt. of NCT–Delhi) for proper operation, maintenance and calibration of their vehicular emission monitoring instruments. During the year, CPCB has inspected about 60 nos. of authorized PCC centres spread over nine zones of Delhi with the objective of improvement in the quality of testing of emission level of the vehicles. During the inspection, the PCC centres were checked in respect of operation, calibration, methodology, preventive maintenance and accuracy of the instrument. For recording all the relevant data / information, a questionnaire was developed and got completed by respective PCC centre. Report of all PCC centres along with observations made during inspection is under preparation.

13.7 Central Pollution Control Board Zonal Office Laboratories

■ West Zone Office – Vadodara

Construction of New Office-cum-Laboratory Building: CPCB has initiated construction of Office-cum-Lab building on 1000 sq meters land procured from Vadodara Municipal Corporation at Subhanpura. The construction activity is being carried out by Civil Construction Unit (CPWD), MoEF, Govt of India. The building comprises of 5 stories (G+4) with all the amenities including provision for Guest House and will also

accommodate sophisticated zonal laboratory of CPCB, Zonal Office, Vadodara.

The CPCB Zonal Office, Vadodara laboratory is full fledged and equipped with the instruments like GC, AAS, BTX which can analyze the water and air samples for physico-chemical, microbiological, pesticides parameters. The total number of water, air, and other samples analyzed during the year are as below:

- Water and waste water samples – 222 Nos.
- Ambient air samples – 224 Nos.
- Source emission samples - 70 Nos.

Standardization of methodology of sampling and analysis of VOCs: Visited M/s IPCL, Vadodara, M/s Lupin Ltd, Ankleshwar along with the team of Head Office in connection with standardization of methodology of sampling and analysis of VOCs. Also, a Scientist was deputed to associate with the officials of CPCB, South Zone office, Bangalore & M/s SGS during the monitoring of VOC in Ambient air, fugitive emissions, effluents etc. in Cuddalore, Tamil Nadu.

■ South Zone Office – Bangalore

Construction of New Office-cum-Laboratory Building: The CPCB South Zonal Office during the year shifted and started functioning its activities from a new building "Nisarga Bhavana". A comprehensive designing of lab was done during the year. The tenders have been floated for carrying out civil work, plumbing, furnishing, electrical and AC works so as to develop state-of-art laboratory to strengthen analytical activities.

Recognition of Environmental laboratories: CPCB has been entrusted with the responsibility of granting recognition of environmental laboratories under Environment (Protection) Act, 1986 for which a joint team comprising of officers from MoEF, CPCB, Zonal Office & SPCB inspect the laboratories for consideration recognition. Nine laboratories from South Zone were inspected / re-inspected during the year.

■ East Zone Office - Kolkata

Construction of New Office-cum-Laboratory Building: The furnishing and electrical work in the newly constructed Office cum Laboratory building of East Zone office in Kolkata carried out by CPWD through Civil Construction Unit, MoEF. The work has been completed as per the initial estimates. Certain incidental works that are included within the sanctioned budget are in completion stage. Procurement of furniture and laboratory support facilities is in progress. Complete shifting of office cum laboratory is expected to be completed by April 2008.

■ North Zone Office - Lucknow

Construction of New Office-cum-Laboratory Building: Establishment of waste water, fresh water, toxicity and bacteriological laboratory and commissioning of de-humidifier in air laboratory have been completed. Installation of Atomic Absorption Spectrophotometer, Gas

Chromatograph, Microwave digestor has been successfully completed. The laboratory provided its facility for Quality Control measures and to upgrade the analytical skills of the analytical staff of the institutions executing CPCB sponsored projects.

Water and wastewater laboratory continued with its regular operation. During the year 1179 Water and 146 Air samples were processed in the lab.

CPCB regularly inspects pollution checking centers, authorized by Directorate of Transport for proper calibration of their vehicular emission monitoring instruments

■ **Central Zone Office – Bhopal**

The committee for office building has finalized the negotiations and short-listed the buildings suitable for office and laboratory. The installation work of AAS has been completed.

Number of samples analyzed during the year are presented below:

- Water & wastewater: 229
- Sludge:04
- Ambient air: 3706
- Stack emissions: 100 stacks
- Fugitive emissions: 40 stations
- Noise monitoring: 150 locations

Recognition of laboratories: The Research Center Laboratory, MPPCB, Bhopal was inspected for recognition as Environmental Laboratory under the E(P)Act.