

ANNUAL REPORT 2013-14



Central Pollution Control Board

South Zonal Office

Bengaluru-560010

1.0

Introduction

The South Zonal Office of Central Pollution Control Board was constituted in October 1988 with jurisdiction of states Karnataka, Tamil Nadu, Kerala, Andhra Pradesh & Goa and Union Territories of Pondicherry and Lakshadweep covering a total area 639474 Sq km and vast coastal stretch of 3025 km. The office presently has strength of around 30 including Scientific, technical and supporting administrative staff. This office has a state of art laboratory with sophisticated instruments and is currently under the process of obtaining ISO & NABL accreditation.

Apart from co-ordination with all concerned State Pollution Control Boards as well as other organizations engaged in Pollution Control Activities, other major activities are carried out under the following Project Heads for implementation of Annual action Plan:

- I Pollution Assessment (Survey and Monitoring)
- II Scientific & Technical Activities and R & D
- III(b) Industrial Pollution Control (Standards, Technologies and Enforcement)
- IV(a) Training programmes
- IV(b) PR, Mass Awareness Programmes & Hindi
- IV(C) Library
- V Information (Database) Management
- VI Waste Management and Urban Pollution Control (plastic waste, Hazardous Waste, Municipal Solid Waste, Bio-Medical Waste, E-Waste & Vehicular Pollution)

A total amount of Rs. 400 lakhs was earmarked to this office in the financial year 2013-14 to carry out the above activities out of which Rs. 360 lakhs was sanctioned and utilised. The major achievements of this office are presented in this report.

2.0

Project Head –I. Pollution Assessment (Survey and Monitoring)

Scheme 1 & 2; Surveillance of NAMP and NWMP stations including review meeting

The objective of the scheme is to ensure and verify the accuracy/quality of monitoring data of NAMP and NWMP received from SPCBs through various monitoring stations and to provide the technical and scientific guidance to concerned laboratory if required.

During this year this office has randomly inspected **8 NAMP** and **9 NWMP** stations located in southern zone. The observations and shortcomings about monitoring & analysis have been discussed on site with SPCB officials and the technical and scientific guidance has been provided for further improvement in quality of monitoring and reporting. It is also stressed to conduct the monitoring at par with CPCB guidelines.

Scheme 3; Monitoring of inter-state river water quality in Southern Zone

The objective of the scheme is to assess the impact of pollution in view of the disputes among states on water quality issues. In the financial year 2013-14 this office has carried out 6 inter-state river water quality monitoring namely River Godavari at Baser, River Tungabhadra at Hochcheli, River Krishna at Devdurga, River Bheema at Gangapur, River Manjari at Bidar and River Thenpennai at Mugalur Bridge. The necessary action plans to prevent and control pollution have been recommended to concerned SPCBs.

Scheme 4; Study of HAPs comprising of VOCs, PAHs, Pesticides, Dioxins and Furans and heavy metals in problem areas and at important cities in South Zone (partially outsourced).

The HAPs requires close monitoring and careful assessment due to their health significance. Hence this study was undertaken with the objective of the study to monitor the criteria pollutants, PAH and Pesticides at source and ambient levels in problem area at Manali Industrial Area in Tamil Nadu.

TO17 USEPA method is adopted to capture all the 60 VOCs by Tenax using ATD(Active Thermal Absorption tube) and analysing through GC-MS. The study carried out in Manali industrial Area in Tamil Nadu by engaging the services of M/s Aqua Designs, Chennai. The VOC samples were captured at 3 areas based on wind directions. 1) Top of the First Aid Centre (M/s Indian Additives limited-Manali) up wind direction. 2) Top of the M/s CPCL Ambient Air station (Middle of Indl Area) and 3) Top of the (M/s MPL R&D centre) Down wind direction. In all the 3 locations the VOCs are reported as BDL Below Detection Limit. The detection limit as per GC-MS instrument and method is $5 \mu\text{g}/\text{m}^3$. The exercise conducted at Manali gives an idea about the procedure of monitoring. The same exercise will be repeated during this year to cross check the reliability of the results.

Scheme 5; Chemical characterization anions, cations & PAH on ambient particulate matter in major cities of South Zone

The main objective of the study is to analyse the chemical composition of ambient particulate matter with respect to PAH, anions and cations to identify the sources of pollution so as to control pollution at source. The study has been carried out at three major locations namely Manali, Thiruvottiyur and Kathivakkam which are located at the northern suburb of Chennai city.

Samples were extracted from filter papers, concentrated for PAH and then analysed using Gas Chromatograph equipped with Flame Ionisation Detector. Out of the 16 PAHs, only five PAHs such as Benzo(b)Fluranthene, Benzo(a)Pyrene, Dibenzo(a,h)pyrene, indenopyrene, Benzo(ghi)pyrene were identified. The findings of the study reflects:

- Benzo(a)Pyrene was present at higher concentrations than the NAAQS in Study areas.
- Higher concentration of all the PAHs was prevalent during the winter season in all the locations.
- The industrial emissions due to use of fossil fuel and increase in traffic volume may be the major sources of PAHs in the particulate phase.



Clean up and sample enrichment

Scheme 6; Assessment of air-borne microbial pollution around Municipal Solid Waste (MSW) management facilities in selected cities of south zone.

Municipal Solid Waste (MSW) handling and management sites invariably generate airborne microbes and its products-bioaerosols. Exposure to airborne microbial has potential health risk to human beings such as respiratory ailments, respiratory inflammation, asthma,

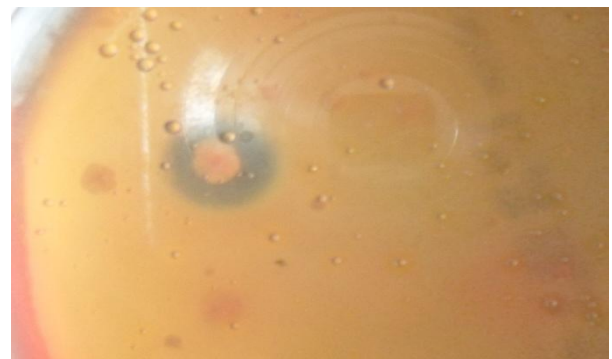
bronchitis, dermatologic irritation/inflammation and allergic alveolitis. In this study, the Viable airborne microbial emissions are monitored using a portable microbial air sampler based on solid impaction technology.

The study indicated that in open dumps, emissions were relatively less when compared to MSW processing site as it demands more intense handling like segregation, sorting, sieving, tipping, loading, heaping etc. Presence of indicator microorganisms and other opportunistic pathogens is also a clear indication of lacuna in storing and clearing waste in a scientific manner. The main sources of such organisms are faecal matter and urine of warm blooded animals, slaughter house waste, slaughtered animal parts, body fluids of infected animals, sputum/phlegm of infected peoples and biomedical wastes.

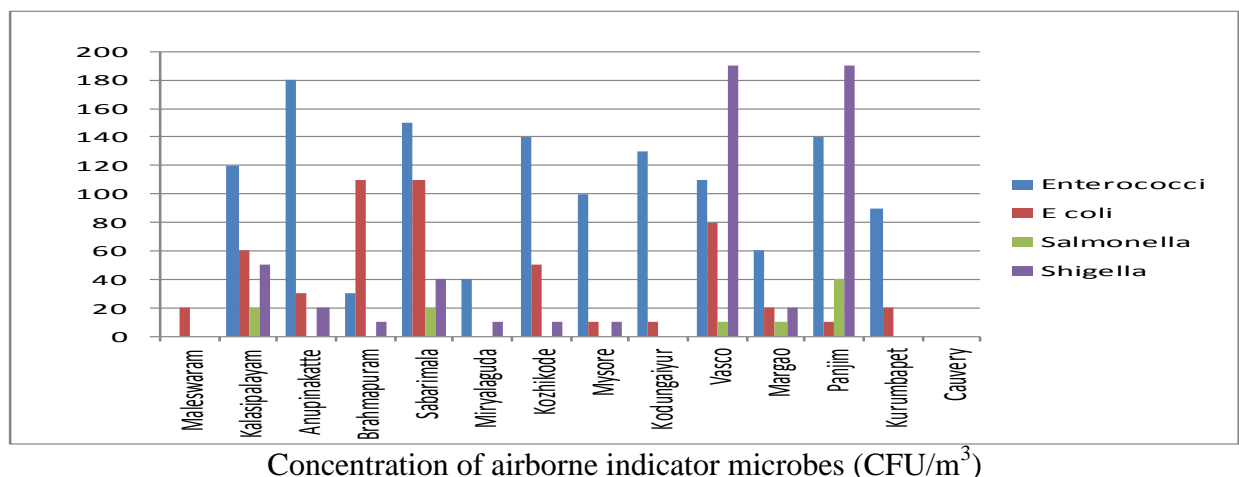
The Bioaerosol emission can be reduced by scientific storage and handling of MSW and better storage, fast clearing, efficient processing with minimal handling with automated machineries can bring about a sea change in the quantum of biological emissions from MSW. Making frequent bioaerosol monitoring in the vicinity of MSW management facilities provides an insight into the airborne biological particle emission and handling.



onsoddo, Margao, Goa



Haemolytic microorganism(Sheep blood agar)



Scheme 7; Air Pollution Modelling

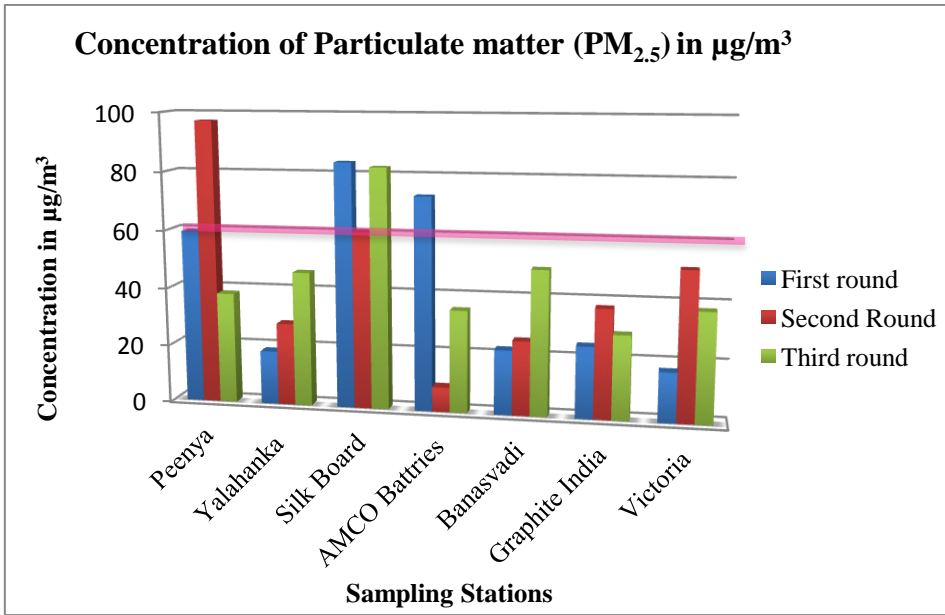
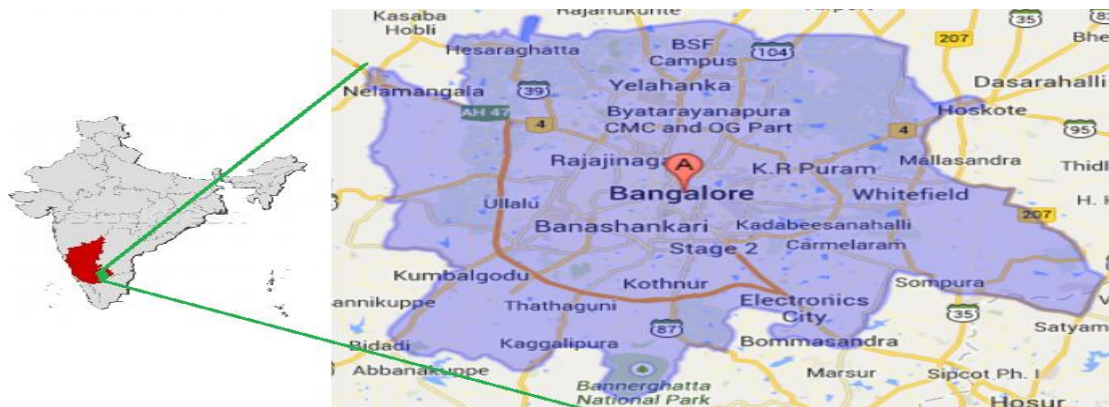
The air quality in Bengaluru is deteriorating due to rapid increase in population and corresponding increase in transport, industrial, combustion and domestic activities. Bengaluru is identified as one of the non-attainment cities with reference to ambient air quality. However development of effective control strategies requires relative importance of various sources that contribute to air pollution.

In this context, a project was undertaken to develop a comprehensive air emission inventory with all possible air emissions at Peenya industrial area in Bengaluru city including industrial and high capacity commercial DG sets using Air Pollution Modelling as a tool. Air pollution modelling is a numerical tool used to describe the causal relationship between emissions, meteorology, atmospheric concentrations, deposition, and other factors. Currently, all major procurements are completed and data collection through questionnaire survey is under progress.

The project is carried out using US EPA approved AERMOD software. The outcome of the project shall be used to prioritize the sources based on their contribution to air pollution, to devise suitable control strategies in consultation with stakeholders and to evaluate the citing of CAAQM & NAMP stations.

Scheme 8; Monitoring of Metals in Ambient air using ICP at Bengaluru City

Central Pollution Control Board has notified, the National Ambient Air Quality Standards way back in 2009 for twelve parameters. A study was conducted to understand about the existing scenario with respect to twelve parameters in Bengaluru city. Totally Seven stations were selected in and around the city covering Residential, Commercial and Industrial areas. It was observed that in few places PM₁₀ and PM_{2.5} are exceeding the limits. The study revealed that the values of PM₁₀ ranged from 37.1µg/m³ to 241µg/m³. It is observed that at few places such as Peenya Industrial Area, Central Silk Board, AMCO batteries PM₁₀ is exceeding the limits. The values of PM_{2.5} are in the range of 8.5µg/m³ to 97.1µg/m³ And PM_{2.5} is exceeding at Peenya Industrial Area and Central Silk Board.

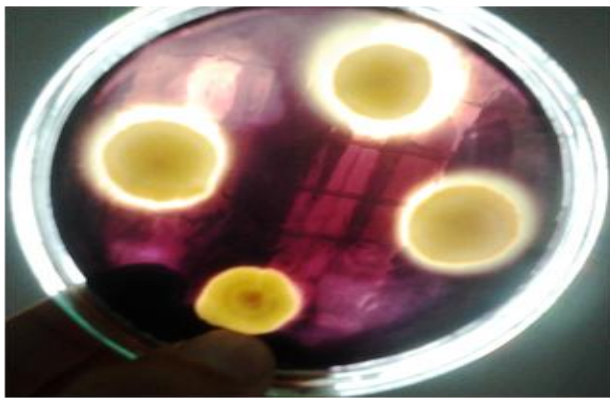


The monitoring of all these parameters on monthly basis throughout the year will enable to understand the exact scenario of pollution levels in Bengaluru city which will help in statutory authorities to devise necessary action plans.

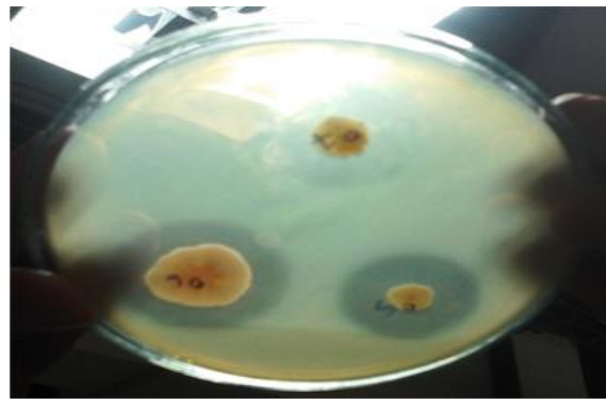
Scheme 10; Characterization of microbial communities in effluent treatment system of various CETPs and individual industries in southern region.

Microbes present in a biological effluent treatment system are the most important factor which affects the overall performance of such treatment systems. Presence of microorganisms which are acclimated to a set of conditions is the prerequisite for setting up a biological treatment systems to degrade a specific waste stream. The present scenario in most of the industrial application is by initial microbial seeding entirely based on stochastic factors after fertilizing the system with substances of exogenous nature.

Several viable bacterial cultures were isolated from biological treatment systems of different industries like tannery, textile (dyeing and processing), paper (pulping and recycling), rice mills and pharma industry (Ibuprofen). The isolated cultures were tested for their functional attributes, like degradation potential against simple carbohydrate, protein, lipid, polysaccharides and complex organic molecules like dyes. Hydrolytic plate assays were carried out to check the degradation potential and versatility of the isolates at different pH & temperature was also assessed. Most of the cultures isolated from different effluent treatment systems were able to degrade simple carbohydrate like starch, protein (gelatin) and lipid (Tween 80). Most of the isolates were not able to degrade polysaccharides like cellulose, pectin and other complex organic compounds like dyes.



Amyolytic cultures



Gelatinolytic cultures



Tween 80 positive cultures



Stocked cultures

The study is likely to throw more light on isolating viable dominant microbes from biological system based on activated sludge technology and to assess their functional attributes in terms of hydrolytic properties.

3.0 Project Head – II. Scientific & Technical Activities and R & D

Scheme 11; Development of infrastructure facilities for preparedness of environmental monitoring in case of episodal pollution.

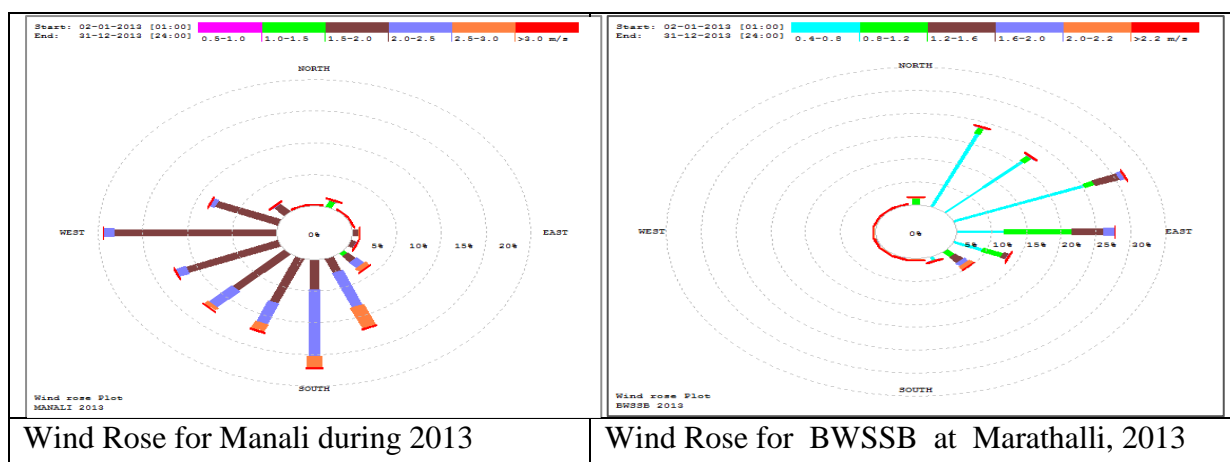
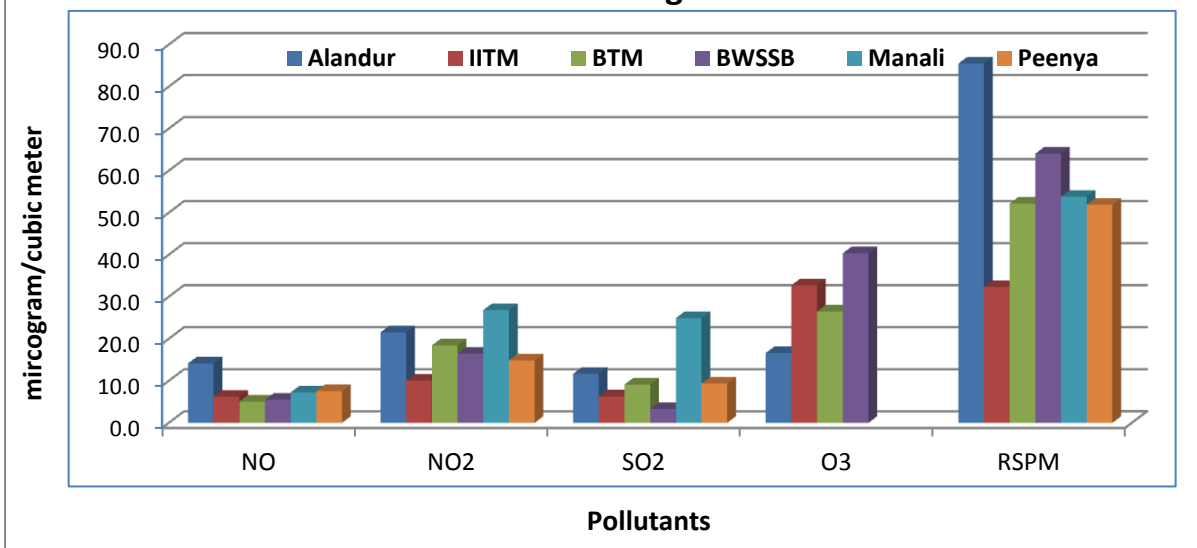
The project aimed for development of infrastructure facilities to monitor and assess the on spot incidental and accidental situation. Seven personnel gas monitors for Carbon Monoxide, Chlorine, Sulphur Dioxide, Nitrogen dioxide, Ammonia, Hydrogen Sulphide, Nitric Oxide have been procured. All staff was trained to use the personnel monitors as and when required.

Scheme 12; Operation and Maintenance of Networking of Continuous Ambient Air Quality Monitoring (CAAQM) stations at Bengaluru and Chennai.

To strengthen continuous ambient air quality monitoring network in the country, 16 CAAQMS and its network were established under private participation project, out of which 6 monitoring stations three each at Bengaluru and Chennai.

The monitoring stations are equipped with various analysers as to measure about fifteen pollutants and seven meteorological parameters. These monitoring stations are equipped with multipoint calibrators by which each analyser can be calibrated as and when required on schedule basis. The processed data reveals that the average data capture rate in Bengaluru is 79.9% and in Chennai the percentage of data capture rate is 63.5% during the year 2013. The data generated by these monitoring stations are linked with local and central networking stations apart from disseminating online data through digital display board to public at each monitoring site. The disseminated data will help the general public in understanding the pollution levels at any point of time. In addition the decision takers can take appropriate actions based severity of pollution levels in different areas.

Ambient Air Quality at Various Locations in Bengaluru and Chennai during 2013

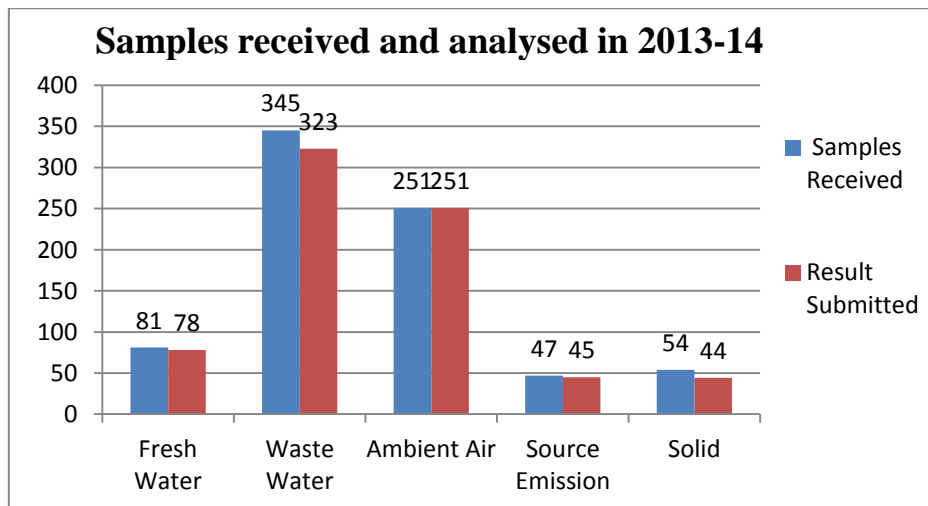


Scheme 13; Operation & Maintenance and development of the laboratory

The project aims to equip the laboratory to meet the demands of the statutory requirements of monitoring & analysis works. The facilities will help in completing the specific project studies. Efforts are made for obtaining recognition under ISO & NABL. The major achievements during this year include;

- The lab participated in two international AQC PT tests and two national AQC PT tests and achieved 95% and 99% accuracy respectively
- Procured certified reference materials, PM_{2.5} sampler, Personal sampler to monitor VOCs and other gaseous pollutants, Gel electrophoresis & Trans Illuminator, GPS and dispensers.

- The sophisticated instruments were entered into regular Annual Maintenance Contract to ensure them in working condition.
- The officials from this office along with officials from MoEF have visited various laboratories located at Hyderabad, Chennai and Panjim for recognition under E (P) Act, 1986.
- The details of sample received and analysed is depicted below:



The well preparedness of the laboratory will help in taking up more monitoring and analysis works, optimum usage of the existing facilities and speedy submission of accurate results with high level of confidence.

Scheme 14; Development of Facilities for Calibration of Air Pollution Monitoring Instruments and Equipment (Ring Test Facility)

The important components of the Project are: (1) Earmarking and Providing Furnishing work (2) Procurement of indigenous items by Zonal Office and procurement of imported items by CPCB, Delhi, (3) Installation and commissioning of all items and (4) Proceeding for trial run and bringing in to normal operation.

In this regard, the required space has been earmarked and provided furnishing work for establishing Ring Test facility, Gas handling pipelines and glass pipelines of 12 ports with static volumetric dilution system. After the procurement of oil sealed mechanical vacuum pump (5 to 21m³/hr) the ring test facilities could be made operational.

Scheme 15; Accreditation/Recognition for South Zonal Laboratory under NABL and E (P) Act

NABL accreditation is a pre-requisite for recognition of the Laboratory as environmental lab under the Environment (Protection) Act, 1986. The necessary documentation is under progress. The awareness programme for staff has been completed. Necessary activities like Calibration of instruments and Glassware, Measurement of uncertainty etc., are taken up on war footing basis. In the meantime the formalities for recognition under ISO 9001:2008 and IS 18001:2007 are in progress.

The accreditation will not only help in recognition as environmental lab in the country but will to streamline all activities and shall add credibility to the organization at national level.

Scheme 16; Statistical Analysis and Interpretation of Continuous Ambient Air Quality data at Bengaluru and Chennai

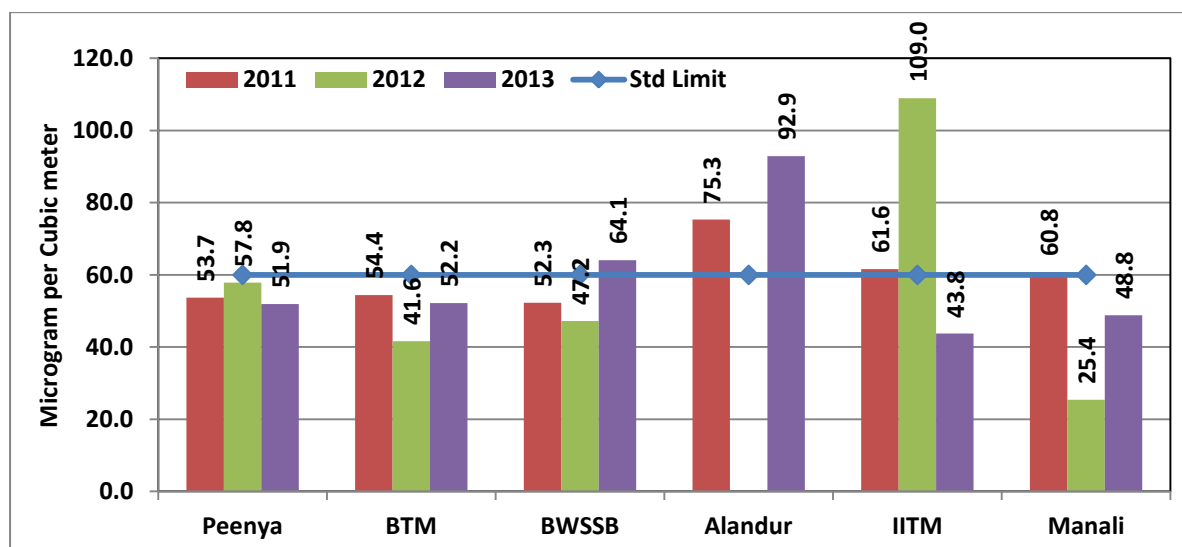
CPCB, Zonal Office Bengaluru has statistically analysed the CAAQMS data of all the six stations from calendar years 2011 to 2013 (three years) with the objective to develop reliable and qualitative data for making management strategies, regulations, policies to mitigate air pollution.

Air quality Index is calculated using various components like correlation study, regression analysis and other statistical tools. The wind rose & pollution rose were plotted using the software “PAVANAAREKH” to analyse the dominant wind direction and dispersion of pollutants around the stations.

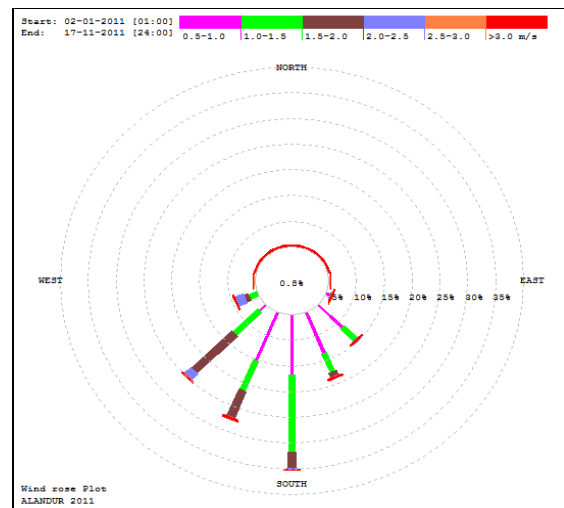
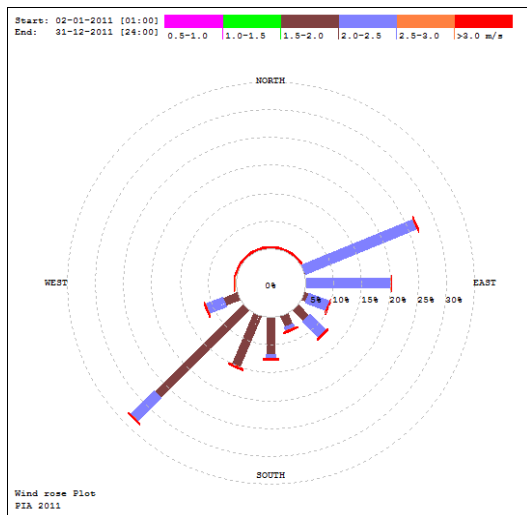
The study revealed ambient air quality trends, Air quality Index, dominant wind direction and pollutants dispersion behaviour at all six locations. The findings will serve as a useful reference for all the concerned stake holders to develop management strategies to control air pollution at six locations.

Table: Air Quality Index and Criteria at all six stations at Bengaluru & Chennai

S.No	Name of the station	Year	Air Quality Index	Air Quality Criteria
1.	BTM Layout, Bengaluru	2011	50.93	Moderate Air Pollution
		2012	51.13	Moderate Air Pollution
		2013	47.63	Light Air Pollution
2.	BWSSB, Marathalli, Bengaluru	2011	48.8	Light Air Pollution
		2012	47.53	Light Air Pollution
		2013	51.62	Moderate Air Pollution
3.	Peenya Industrial Area, Bengaluru	2011	55.57	Moderate Air Pollution
		2012	54.33	Moderate Air Pollution
		2013	42.93	Light Air Pollution
4.	Alandur, Chennai	2011	61.83	Moderate Air Pollution
		2012	32.3	Light Air Pollution
		2013	69.64	Moderate Air Pollution
5.	IITM, Chennai	2011	60.33	Moderate Air Pollution
		2012	77.26	Heavy Air Pollution
		2013	29.87	Light Air Pollution
6.	Manali, Chennai	2011	64.97	Moderate Air Pollution
		2012	37.16	Light Air Pollution
		2013	55.83	Moderate Air Pollution



Annual Average Respirable Suspended Particulate Matter at various Locations in Bengaluru and Chennai During 2011-2013



Wind rose of Peenya industrial estate, Bengaluru and Alandur, Chennai

Scheme 17; Development of methodology for assessment of CO₂ absorption through Green Belt Emission from industrial process and its carbon budgeting in selected industrial sector (Partially outsourced).

The cement industries are significant contributors to the imbalance in the ambient air quality and reported to produce 5% of total Green House Gases (GHG) in the country. As per the conditions for Environmental Clearance by MoEF, industries are compelled to develop green belt in 30% of the total project area to sequester Carbon dioxide so as to mitigate the air pollution caused by the industries.

This project was taken up to assess the green belt area required for sequestration of carbon dioxide emitted from the selected cement industry in Karnataka and to identify the species of plants for effective carbon sequestration. The standardization of the total area designated for development of green belt in the selected cement industries based on the study is under process. In the project, baseline database on plant species (fast growing plants, plants native to the ecological zone) that could be effectively raised in green belt of industrial area, acts as bench mark for assessing long term benefits and to manage the ecosystem and atmosphere, will be developed.

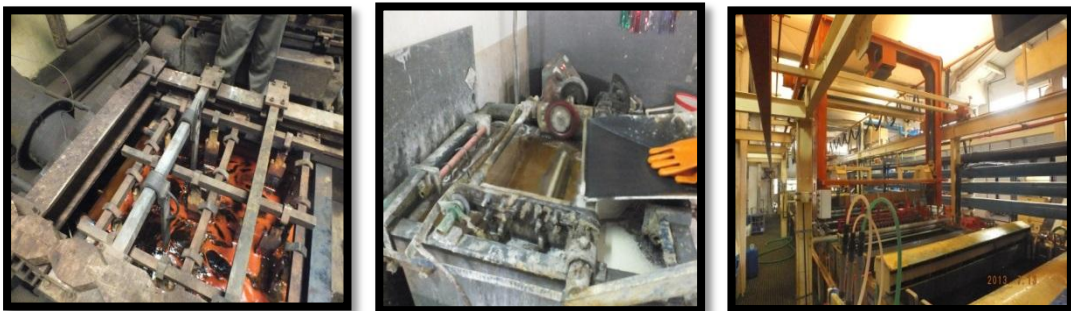
4.0 Project Head – III(b).Industrial Pollution Control (Standards, Technologies and Enforcement)

Scheme 19; Assessment of Environmental Compliance of Electroplating units in Bengaluru

Electroplating is a technique of deposition of a fine layer of one metal on another through electrolytic process during which effluent containing toxic materials and heavy metals, air emissions and solid wastes are discharged into the environment. The electroplating units in Bengaluru is situated in different industrial areas namely Peenya, Rajajinagar, Yeswanthpur the western part of the town & at Koramangala in the south east, at Annekal, Bommasandra, Attibele, Hosur mostly in the southern part of the town. This study was taken up to assess the status of pollution control measures taken by the electroplating industries in Bengaluru.

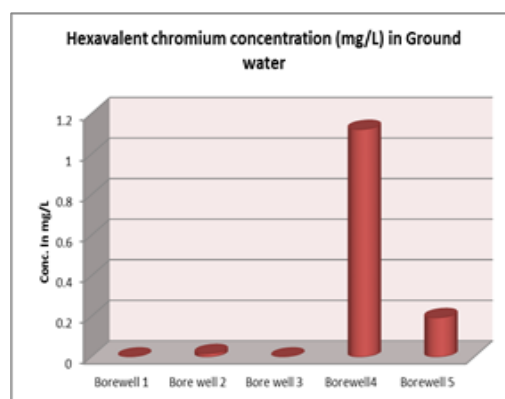
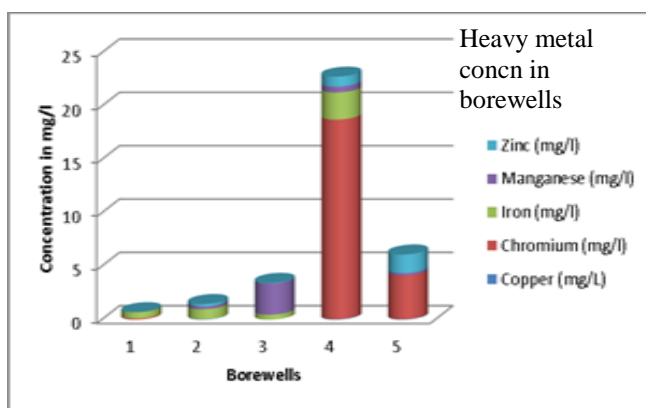
The first phase of the study in Peenya industrial estate revealed that majority of the units are small scale units involved in job work characterised by haphazard location. The unscientific management of effluent, poor housekeeping, inadequate pollution control measures and unskilled manpower are leading to pollution threats affecting the environment and ground water in the vicinity.

The suggestions for betterment of the situation includes relocation of industries in designated industrial estates, proper management of effluent, utilization of trained manpower and adoption of cleaner technology. This will help to minimise the pollution load from electroplating units and to stop ground water pollution further in the Peenya industrial area.





Electroplating Units at Bengaluru



Scheme 20; Assessment of Pollution from Textile Dyeing units located in Tirupur, Tamil Nadu and measures taken to achieve ZLD

Based on the directions of Hon'ble High Court the textile dyeing units operating in Tirupur have commissioned the ZLD plant consisting of RO plant and reject management system in 2010. A study was taken up to assess the measures adopted by the Textile Dyeing units in Tirupur and conducted performance evaluation of various pollution control system provided by the industries. The study also focused on status of surface & ground water quality in the surrounding area.

Findings revealed that individual ETPs and CETPs in Tirupur have implemented ZLD by installing combination of nano filtration, ultrafiltration and Reverse osmosis to recover water and brine solution. The water so recovered is recycled in the process and thereby fresh water consumption is reduced by 80-85%.

The RO reject concentrated through combination of MVR/ MEE (falling film, forced circulation evaporator)/ crystallisation/centrifuge and recovered either in the form of pure salt or in the form of brine solution being reused in the dyeing process. However still 5-7 % concentrated effluent having 30-35% TDS concentration being is sent to solar evaporation ponds. None of the CETPs or IETPs are practising 100% salt recovery through advanced concentration techniques. Lime sludge generated from chemical treatment is sent to cement industries for co-processing. The CETPs/IETPs handling combined sludge from chemical and biological system are facing sludge disposal problem. The ground water quality will be monitored and the impact of ZLD system adopted in CETPs and IETPs will be verified in second phase of study.



Multieffect Evaporator

Mechanical Vapour Recompressor

Solar evaporation ponds

Scheme 21; Life Cycle Assessment (LCA) of Distillery Spent Wash and Pollution mitigation based on Environmental, Economic Considerations

The Spent Wash generated from molasses based distilleries, is dark brown in colour, having high COD, BOD, Suspended solid & inorganic solids requires careful handling and proper disposal to avoid damage to the environment. Average generation of spent wash is around 8-12 litres / litre of alcohol. A number of treatment technologies like physicochemical processes, bioremediation, Biogas production, bio-composting, other Biological processes, membrane filtration, disposal on land, Co-processing in cement industries, Concentration of spent wash in multiple effect evaporators and its subsequent incineration etc., are currently in practice.

The performance study was carried out to evaluate the environmental impacts and economic benefits of each treatment technology using “Life Cycle Assessment” as a tool. The study was carried out in 12 distilleries covering different treatment technologies.

The study revealed that, evaporation process is comparatively expensive and costs Rs. 125-135 per m³ of spent wash. The cost of operation of spray drier is also Rs. 205 per m³ of spent wash. The incineration process generates steam but however, maintenance cost of the boilers is high due to the presence of inorganic salts. The feasible technologies are bio-methanation followed by bio-composting in terms of cost and fate of the pollutants. The nutrients are recycled in the soil and one m³ of spent wash generates fertilizer value of Rs. 135. Integrated evaporation is one of the energy saving technologies which produce less than 8 m³ of spent wash per m³ of alcohol.

One time controlled land application (OTCLA) after removing maximum quantity of degradable organics is a good option for the lands having less than 50 rainy days. It is more suitable for Southern Peninsula. Distilleries located near to major rivers having more than 100 rainy days are not advisable to follow OTCLA. The co-processing in cement industries involves huge transportation cost and large quantities of potash value are lost into the cement; hence it may not be economical to distilleries.

Direct composting of spent wash is an energy loss method where huge quantities of organic loads are converted to carbon dioxide using more energy. In the direct compost yard the odour problem is severe.

By and large Bio-methanation followed by bio-composting is economical and also yields value added product. For distilleries having space constraint, recovery of potash by MEE followed by spray drier/ incineration is a feasible choice. OTCLA could be adopted in areas having scanty rainfall and in other areas on rotation basis once in four years.



OTCLA



Composting



MEE

Scheme 22; Study of Solvent Recovery Systems installed in Pharmaceutical and Pesticide Manufacturing Units in Southern Zone

Organic solvents are used in Pesticide and pharmaceutical industries as reaction media and for separation & purification of synthesis products. As per Charter on Corporate Responsibility for Environmental Protection (CREP), the efficiency of solvent recovery should be at least 90%. This study is taken up to know the actual status of recovery, reconditioning and reuse of solvent in the Pharmaceutical and Pesticide industry.

The work is divided into two phases to study pesticide in first phase and Pharmaceutical in second phase. The operational status of pesticide industries in Southern zone was obtained from concerned SPCB's and through questionnaire survey followed with in depth study. The study mainly focused to obtain/ assess the solvent recovery with respect to their types, boiling point, and operational temperature etc., and also the condensers (primary, secondary, tertiary and common vent condensers) are in place.

The findings of the study indicates that, the pesticide industries generally use solvents like Ethylene Di chloride (EDC), Hexane, Dimethyl Carbonate, Toluene, Iso propyl Alcohol etc., Both ground level (Horizontal & Vertical) and Underground or mounded storage tanks with breather valve cum flame arrester are provided. Based on the mass balance approach, the estimated solvent recovery and loss from the system varies between 81.7 to 96.66 % and the loss varied between 3.34 to 18.3 %. It also confirmed the presence of VOC's in the ambient air; the reported compounds are Carbon Tetra Chloride, Ethyl Benzene, Toluene, Bromo Benzene etc.

Phase-I study is completed the study will be extended to Bulk Drug units and some more pesticide industries will be studied in the phase II.



Breather Valve



Colour coding of lines



Condensers

Scheme 23; Assessment of Pollution Control System in Modern Rice Mills

Rice of different varieties such as Parboiled and White (Raw) Rice are produced by milling of paddy during which air & water pollution arises due to fugitive emissions and discharge of soak water. The study was taken with an objective to assess the status of pollution control measures. Ten rice mills were inspected to verify the pollution control methods adopted by them.

Study concluded that installation of suction hoods in unloading area, replacing cyclone separator by bag filter, storage of husk in silos, providing APCD in boiler and closed conveyors shall help in mitigating air pollution. The effluent generated has to be treated in ETP preferably by anaerobic treatment followed by Aeration and the treated effluent may be reused in process.



Bag filter



Emissions from Dryer



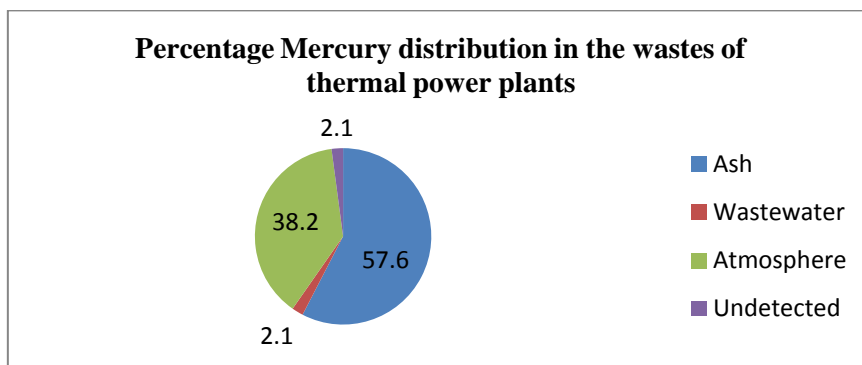
View of ETP & Spray Pond

Scheme 24; Study of Mercury Emission from Thermal Power Plants in Southern Zone.

Mercury and its compounds are highly toxic which causes significant ailments. Mercury occurs naturally in coal and its content in Indian coal ranges between 0.01 ppm to 1.1 ppm. Assuming the average mercury content in Indian coal to be 0.25 ppm, huge quantity of unintentional mercury is released into the environment. The coal consumption in thermal power plants alone is estimated to release around 59.29 tons per annum of mercury.

The study is taken to explore the quantity of mercury emitted from TPP's to air and soil environment by monitoring, analysis & applying certain mathematical models to design appropriate treatment technology.

Study was carried out in three thermal power plants using coal as fuel to assess the quantity of mercury in coal and its various routes of entry into environment. The values of mercury in the coal, wastewater, fly ash, bottom ash and atmospheric particulate emission and gaseous emissions were observed to be 0.343 mg/kg, 5.93 µg/l, 0.791.6 mg/kg, 0.254 mg/kg and 3.43µg/Nm³ and 13.78µg/Nm³, respectively. Maximum value observed in the soil is 0.870 µg/g of mercury. However, imported coal has nearly three times low mercury than the Indian coal but is expensive.



Scheme 25; Status of RO rejects management by various CETPs and individual industries in Southern Region

Industries are trying for maximum utilisation of treated wastewater by installing RO system. The permeate from the RO is reused, whereas reject of RO contains high TDS, so the

disposal of RO reject becomes a challenging issue. The objective of the project was to study the prevailing treatment methods adopted by various industries for management of RO reject. Several disposal methods are existing for safe disposal of RO Reject, which includes direct surface water discharge, discharge to a sewage treatment plant, deep well disposal, evaporation ponds, thermal evaporation system and dilution with sewage/ treated effluents before surface discharge.

Discharge to surface water method is practically infeasible because of the lack of perennial stream flow with sufficient carrying capacity to assimilate the contaminants present in the concentrate. Solar Evaporation and Thermal Evaporation methods are presently adopted in which disposal of the salt generated is the main concern and high cost for installation and operations.

Dilution with treated sewage is one of the best options, which is cost effective. The diluted effluent can be recycled and reused for agriculture purpose. An option may also be kept open for industries and CETPs to dilute and discharge the RO reject with their own domestic treated wastewater or treated municipal sewage water and subsequent discharge to perennial rivers having minimum flow. The discharge quality and quantity shall be continuously monitored by installing online meters.



Solar Evaporation Pond



MEE

Scheme 26; Verification of compliance of standards by industries in southern zone including ESS and Follow up of court directions etc.,

Under ESS activities, highly polluting units falling under 17 categories are selected through computerized random generation system for surprise inspection/ monitoring to check the compliance of consent conditions, standards, CREP, etc. Based on the inspection reports, letters/directions are issued depending on severity of violations either under Section 18(1) (b) of the Water (Prevention and Control of Pollution) Act, 1974 or under Section (5) of the Environment (Protection) Act, 1986.

During the financial year 2013-14, 34 no. of industries were inspected, viz. 12 units in Andhra Pradesh, 04 units in Karnataka, 06 units in Kerala and 08 units in Tamil Nadu and 4 units in Pondicherry covering various sectors.

State	Number of visits	Number of units inspected	No action require/unit found closed	General Letter from H.O.	Directions u/s 18(1)(b) of the Water and Air Act	Directions u/s 5 of E(P)A
Andhra Pradesh	3	12	0	4	1	0
Goa	0	0	0	0	0	0
Karnataka	2	4	0	0	0	2
Kerala	2	6	3	1	0	2
Pondicherry	1	4	1	2	0	1
Tamil Nadu	2	8	2	2	0	2
Total	10	34	6	9	1	7

Follow-up of Court Directions

As per the directions of Appellate Authority, Delhi (Appeal No. 02 of 2012) and National Green Tribunal, (Appeal No. 15 of 2013) Chennai three rounds of joint source and ambient monitoring of M/s athiappa Chemicals (P) Ltd, Puducherry along with NEERI, Chennai has been completed. The interim report on first two rounds of monitoring is submitted. Final report is under preparation.

5.0**Project Head – IV (a) Training programmes**

Scheme 27; Imparting various training programme to staff sponsored by Headquarters and other organizations and evaluation of effectiveness of training imparted to officials of SPCB/PCCs.

i) *Training programme to staff sponsored by CPCB, H.O, Delhi*

S.N	Candidate Name with Designation	Schedule	Course
1	Hands on training for odour and fugitive emission measurement under bilateral project between CPC - VTT Finland	April 13 – 17, 2013	Smt.H.D. Varalakshmi, Sc-C
2	Selection and Performance evaluation of industrial air pollution control equipment conducted by NPC at Chennai	June 13 – 14, 2013	Sh.R.Rajkumar, Sc-C
3	Hands on training for odour and fugitive emission measurement under bilateral project between CPC - VTT Finland	Sept 13 – 17, 2013	Sh.R.Rajkumar, Sc-C
4	Hands on training on source emission monitoring and measurement techniques by experts from VTT – Finland at CPCB, Delhi	Nov 26 – 28, 2013	Ms Anjana kumari V, Sc-B
5	Hands on Advanced Instruments of Water Quality Testing at National Institute of Hydrology, Roorkee	December 2-6, 2013	Smt. B S Anupama, SSA
6	Awareness workshop on New POPs under stockholm convention at Delhi	March 7, 2014	Smt.H.D.Varalakshmi, Sc-C
7	Design operation and maintenance of STPs, CETPs and CBMWTF. By ESI Hyderabad	March 10–14, 2014	Sh.G. Dharmalingam Sc-C
8	National Convention on environmental engineer and third international conference and exhibition envision 2025 held at CSIR - CLRI campus Adyar, chennai	March 12–14, 2014	Ms. Sowmya D, Sc-B

ii) *Training of SPCB's/ PCC's and other agencies*

Sh. A. Gnanavelu, SSA was deputed to Goa SPCB to train the laboratory officials on “Monitoring & analysis of all Environmental Parameters”. After the programme an objective test was conducted to assess the usefulness of the training programme. All officials who attended the training programme have scored more than 90%.

The officials from this office trained around 50 participants in various pollution control related programmes organised by CAAP- Environmental Training Institute, Bengaluru.

A delegation from Australia and Finland representing “Municipal Solid waste Management Facilities in their Countries” visited Zonal office to understand more about MSW management adopted in Southern India. Latest technologies adopted in their countries as applicable to Bengaluru and other places were elaborately discussed. After this a “BioBin” used for onsite composting has been kept in the office campus for trial run. Detailed study is under progress.

iii) *Training of Students*

This office facilitates capacity building among user community in all fields of pollution mitigation & its applications. As a part of outreach policy, it provides bright external students at post graduate levels from different universities across country for carrying out dissertation work / summer training. This office carried out research work in various environmental disciplines by engaging a good number of students along with their dissertation studies.



Discussion with delegates from Finland & Australia

6.0 Project Head – IV (b) PR, Mass Awareness Programmes & Hindi

Scheme 28; Organizing mass awareness Programme in High School, Colleges and Public places, evaluation of Environmental Awareness among students community and conducting Hindi Divas and organizing get together programme for officials of CPCB ZO(South)

World Environment Day was observed on June 5, 2013 at Zonal Office, Bengaluru to promote awareness on the importance of Sustainable Consumption. “Think. Eat. Save. Reduce Your Footprint” was the theme of WED, 2013 which was emphasized throughout the programme.

An awareness campaign was initiated to promote the use of clay Ganesha idols during celebration of Ganesha festival to maintain ecological sustainment. Clay Ganesha idol was distributed in several educational institutions on September 6, 2013. Smt.H.D. Varalakshmi and Smt. Mahima.T delivered speech in regional language on the environmental impacts of Ganesh Chaturthi and on measures to resolve the same. Teaching faculty and students pledged to follow the same.

To promote the use of Rajbhasha Hindi at CPCB Zonal Office, Bengaluru; Hindi Diwas was celebrated on October 31, 2013. During the occasion, Hindi noting and drafting, debate and Kavitha recitation competitions were conducted. A message in Hindi language was given by Zonal Officer. Quarterly progress reports on status of implementation of Hindi are regularly sent to department of official language, Bengaluru and Town official language implementation Committee, Bengaluru. At present, a Hindi word is written in the notice board to familiarise about language.

Around 80 Post- Graduate Students and ten teaching faculty from Palakkad, Kerala visited this office and laboratory to understand about the activities of CPCB and its role in state of Kerala.

The staff were encouraged to celebrate eco-friendly Deepavali festival without bursting of crackers. As a traditional practice during festival, drawing rangolis was also taken up to promote the theme.



Celebration of World Environmental Day



Celebration Eco Ganesha festival



Awareness programme to post graduate students



Hindi Diwas



Eco-friendly Diwali celebration

7.0 Project Head – IV(C) Library

Scheme 29; Development of library, procurement of journals, books, etc.,

This office has subscribed for 10 newspapers covering all regional languages of South-India and two weekly magazines for the benefit of the staff. The staff's keeps a track on the environmental issues published in both print & mass media and appropriate action is initiated as and when required. This office subscribed for three environmental journals and procured three scientific & technical books. The journals and magazines are widely circulated among the staff to make them aware of the current environmental issues. Installation of e-granthalaya software is under pipeline.

Scheme 30; Digitization of documents of South Zonal Office, Bengaluru

In house database preparation by digitizing/scanning of all existing records has been taken up. One High speed scanner Model No Canon DR-C125 and one colour printer Model No Canon LBP 7200DN are procured for the same. The minutes of the various meetings, circulars, office orders, and reports are circulated electronically for benefit of staff. This helps in easy tracking and speedy disposal of issues. This will also help in having back-up data of all important reports and correspondence in concisely.

Scheme 31; Operation and Maintenance of computer systems & its peripherals and AMC of computers

This office is having Annual Maintenance Contract with M/s Avishkaar Techno Solutions Pvt. Ltd, Bengaluru for smooth operation & maintenance of the existing 36 computer systems, 27 printers, 4 laptops and 2 scanners. In addition, six systems were upgraded with 1 GB ram. The optimal usage of computers, printers and scanners were achieved by timely procurement of Cartridges, drums & blades and other accessories as applicable. Seven new computers with i-5 processor and one computer with i-7 processor with Windows 8 Operating System were installed to strengthen the existing facilities. The provision of computers to individuals has made self-sufficient by allowing them to do tasks independently in a speedy manner. One day training was provided to all officials to familiarise with working of windows 8 operating system.

This office is having Local Area Networking (LAN) of 2-MBPS data line from NIC, Koramangala provided by BSNL facilitating internet connection with server capacity of 750 GB and three Wi-Fi access points. One-day training program was organized on “Networking and its basics” in collaboration with NIC, Bengaluru during September 2013. Presently, this office is successfully utilizing networking and sharing folders in all the systems and working on the concept of “Save Paper and Conserve Energy”. Presently, drafting and communications such as letters, reports, circulars, office orders etc are being done through networking. This will mainly help to organise all the information and increases accessibility in minimal time.

9.0 Project Head – VI Waste Management and Urban Pollution Control (plastic waste, Hazardous Waste, Municipal Solid Waste, Bio-Medical Waste, E-Waste & Vehicular Pollution)

Scheme 32; In-vessel rapid composting systems for urban households and commercial establishments

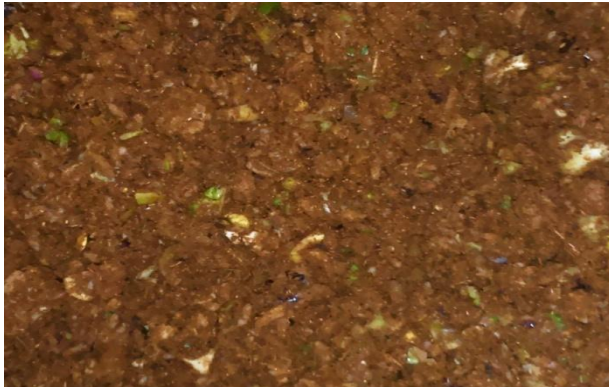
The study envisages the development of a user friendly, inexpensive and sustainable in-vessel composting technology suitable for Indian conditions for the management of source separated household organics with the main objective to mould a robust vessel model for the in-vessel composting technology. Emphasis was laid on the development of inoculums and design of prototype vessel essential for the development of a state of the art technology which is sustainable and economically viable.

At the end of the study during the current financial year, 129 bacterial cultures were isolated from various waste materials and maintained as stock collection for the preparation of effective composting microbial consortium. Most of the cultures were able to degrade simple carbohydrates (starch), protein (gelatin) and lipids (tween 80) while some of the cultures were positive to pectin degradation but none of the cultures exhibited cellulose and dye degradation capabilities. Cultures which exhibited good hydrolytic properties against 3 to 4 substrates were selected for the formulation of mixed microbial consortium. The performance of microbial consortium was mixed with bulking agent and incorporated with compost feed stock for composting. Composting trials were monitored for 20 days and temperature profiles were recorded. The distinct thermophilic and mesophilic phases were observed in all lab scale composting trials.

For in-vessel composting, a simple, user-friendly, self-sustaining, prototype vessel was designed consisting of cylindrical process drum housed in a fiberglass cylindrical moulding with appropriate insulation in between. The conical top lid consists of a hopper/ shredder attachment for feeding the waste which also doubles up as a vent. The stirrer assembly housing in the top lid connects the external handle (manual operation) to the central stirrer shaft with ribbon-paddle type stirrer blades. The bottom constriction leading to a rectangular opening serves as the outlet for finished product and the sliding perforated plastic plate doubles up as bottom gate and leachate strain. Leachate will be collected below the bottom

gate in removable fiberglass housing. The vessel is designed for induced aeration and temperature management without any mechanical blower or fan.

This study is in progress and few more work components has to be designed, including the fabrication of prototype and lab scale validation studies. There is further scope of research on optimization of microbial inoculum, optimization of composting process in the vessel prototype and lab scale in-vessel composting validation studies using the prototype.



Initial compost feed stock



Final composted product after 20 days

Scheme 33-36; Monitoring of Operational Sewage Treatment Plants (STPs), Common Effluent Treatment Plants(CETPs), Municipal Solid Waste Management Facilities, Common Bio-medical Waste Treatment Facilities (CBMWTF), Treatment, Storage and Disposal Facilities in South zone

- Totally, 24 STPs located at Chennai, Coimbatore, Vasco-da-gama, Margao & Panaji in Goa, Trivandrum, Tiruchirappalli, Pamba (Kerala) were monitored and it was found that 80% of the STPs are complying with norms. Routine maintenance with scientific management was lacking at many places despite having desired treatment units leading to partial non-compliance.
- Performance evaluation study of nine CETPs i.e 5 in Tamil Nadu, 2 in Andhra Pradesh and 2 in Karnataka has been carried out, in which four CETPs at Tamil Nadu are achieving Zero Liquid Discharge (ZLD). The partial compliance is observed due to improper maintenance and un-even hydraulic load on the CETP.
- 21 MSW management facilities at Chennai, Trichy, Madurai, Coimbatore, Kottayam Sabarimala, Calicut, Kottakal, Panaji, Vasco-da-gama, Cochin, Shimoga and

Pondicherry were monitored for verification of compliance of MSW Rules. The improper segregation at source and adoption of suitable technology are the main reasons for partial compliance in many facilities.

- A high level lead by Dr. K. Kasturirangan visited “Waste to Energy Facility” located at Hyderabad. The officials from this office accompanied and exchanged fruitful discussions. Finally, a report was also sent to Planning commission.
- The MSW management facility at Suryapet in AP was visited to assess the status of fund utilization granted by CPCB. After continuous efforts the audited UC was obtained.
- Monitoring of three CBMWTFs was carried out at Pondicherry, Bengaluru and Mangalore. The guidelines of CPCB for operation & maintenance are not followed and leading to non-compliance
- Two TSDF sites one at Bengaluru and One in Kochi were monitored and observed that both the sites are complying with HWM Rules. Further improvements in cautious management of all stipulated conditions by respective SPCB’s are desired to ensure 100% compliance.



Dr. K. Kasturirangan visit to Waste to Energy Facility, Hyderabad

10. Other Major activities

58th National Chairmen and Member Secretaries conference of all SPCBs/PCCs during February 21-22, 2014 at ITC, Windsor, Bengaluru

- CPCB South Zone Office, Bengaluru has successfully coordinated with Karnataka State Pollution Control Board in organizing the 58th National Chairmen and Member Secretaries conference of all SPCBs/PCCs during February 21-22, 2014 at ITC, Windsor, Bengaluru.
- The Chairman, CPCB told that this was one of the best ever conference held so far as it was well represented by the main decision makers from Ministry of Environment & Forests, CPCB, chairmen & Member Secretaries of 28 state PCB's and PCC's from 5 Union Territories.
- Around ten resolutions were made after discussing various issues during the conference. The concluding session of the conference was presided by Hon'ble Union Minister of Environment & Forests Dr. Veerappa Moily and Hon'ble State Environmental minister Sh. Ramanath Rai.
- The two days conference was concluded with a mission to prosper through sustainable growth so as to handover clean environment to next generation.



Organizing 5th Regional Chairmen and Member Secretaries Conference of Southern SPCBs/PCCs

- Successfully organized 5th Regional Chairmen and Member Secretaries Conference of Southern SPCBs/PCCs on January 10, 2014 at CPCB Zonal Office, Bengaluru. Over 20

participants from five states, one Union territory and MoEF, southern zone regional office participated in the conference.

- The Specific region wise as well as common issues were discussed and concluded with remedial action plans to be implemented in time bound manner. The conference paved ways to further strengthen co-ordination between CPCB and SPCB's and to solve interstate disputes and to enhance interstate relationship. Regular follow-ups being made on action to be taken by SPCBs/ PCCs based on the recommendations made during the conference.
- The conference concluded by agreeing to use science and innovation as critical tools to boost the development and for pollution mitigation in the country.



Organizing meeting to review the status of pipelines carrying crude oil/petroleum products on existing pipeline in Chennai

A meeting was organized to review the status of pipelines carrying crude oil/ petroleum products on existing pipeline to transport of petroleum raw material/products from source and disseminate points in Tamil Nadu along with TNPCB officials and stakeholders at Chennai during April 27, 2013. The meeting was chaired by Hon'ble Minister for Ministry of Environment and Forests, Government of India.

Based on the recommendations of the meeting, this office has made detailed survey on existing pipelines (surface & underground) carrying petroleum products and number of accidents recorded in south India and prepared the comprehensive report on "Overview on Status of pipelines carrying crude oil/petroleum products from ports and refineries of South India" .

Subsequently, a meeting was organised in Chennai with all major oil companies to assess the status of safety measures adopted in the pipelines carrying the oil. This meeting was very crucial in light of the leakages occurred from the pipelines belonging to M/s BPCL, Chennai.

Episodal Pollution due to pipeline leakage at Tondiarpet, Chennai

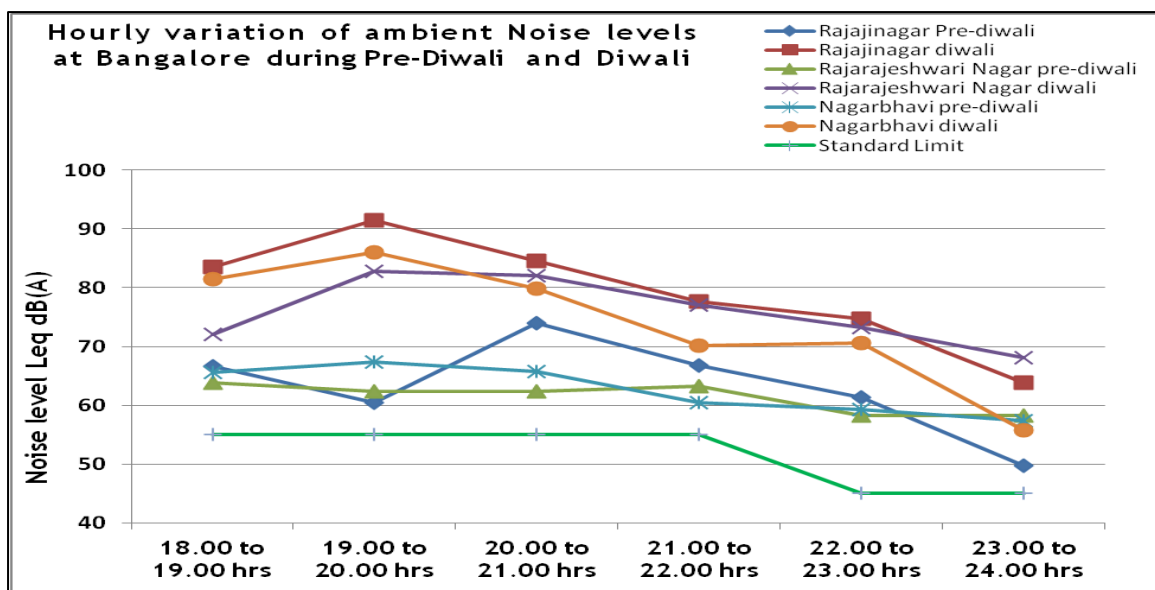
An episodal accident was occurred due to leakage of petroleum products from pipelines at Tondiarpet, Chennai during July, 2013. During inspection, it was observed that ground water and soil at certain locations is contaminated by leaking of petroleum products from pipelines laid long back. As a consequence, directions under section 5 of E (P) act, 1986 was issued to M/s BPCL to close the pipelines and not to transport any petroleum products and to clean all affected bore wells and supply drinking water to all residents residing in that area. Presently, the M/s BPCL has complied with all directions and restoring of the damage made to environment is under progress.

Study of Noise & Air Pollution during Deepawali Festival, 2013

Bursting of crackers during Deepawali festival is a major source of deterioration of Ambient Air Quality. To study the impact of bursting of fire crackers on ambient air quality and noise pre-deepawali and during Deepawali, 2013 noise level and ambient air quality monitoring was carried out at three locations namely Rajajinagar, Nagarbhavi and Rajarajeshwarinagar in Bengaluru.

The values of PM₁₀ were found to be in the range of 21.7 to 85.5µg/m³, the values of SO₂ were found to be in the range of 2 to 6 5µg/m³ and the values of NO₂ were found to be in the range of 8.72 to 33.15µg/m³ during the entire monitoring programme.

Ambient noise level was also monitored and it was observed that due to increase in bursting of crackers there was an increase in noise level during deepawali by 25% to 27%.



GIS Portal on Water quality

A technical database on GPS co-ordinates of 920 industries present in south zone with respect to the project “GIS Portal on Water Quality” was prepared. This will enable spatial temporal distribution of industries and environmental pollutants and in assessing pollution load released into the environment.

Co-ordination and preparation of material for the study visit of Parliamentary Standing committee of science and Technology

The Parliamentary Standing Committee on Science & Technology is regularly visiting various cities for assessing the environmental status and conducting review meetings with all stake holders. This office has coordinated all such visits to Tirupati, Chennai, Hyderabad, Bengaluru and Vishakhapatnam. The desired technical material in bilingual covering all environmental issues has been prepared and given to MoEF for subsequent distribution among committee members. The proceedings of all such meetings has been recorded and sent for necessary action.

Inspections of industries under NGRBA

Under NGRBA scheme two officials were deputed from this office to North Zonal office has inspected around 88 industries in Uttar Pradesh and report with necessary recommendations is submitted.

Work related with High Court and National Green Tribunal

Sixteen legal cases were handled, for which counter affidavit for 10 cases in NGT, Chennai, 2 cases in High Court of Madras, 1 case in High Court of Kerala and 1 case in High Court of Hyderabad has been filed. Out of 10 cases in NGT, Chennai only one case i.e Appeal No. 163 of 2013 M/s Chemplast Sanmar Vs CPCB, CPCB is the main Respondent; the case is against the CPCB direction under Section 5 of EP Act, 1986.

Case Details with NGT (SZ) - Chennai			
Sl.No	Application No.	Party Filled By and CPCB Position In Respondent	Issue related to
1.	127 of 2013	Sri.D.Sulif of Kuzhuthurai, KK district 4 th respondent	Regarding Environmental Clearance for Road lining NH 47. Kerala/Tamil nadu border
2.	155/2013 Original petition filed at Madurai 24 th Feb 2011 as WP (MD) 2557 of 2011 and now transferred to NGT, Chennai	Ambai Taluk Tamirabarani Vivasayigal Nala Sangam & 2 (petitioners) Vs Union of India & Ors. 3 rd respondent	Case against The India Cements Ltd., (Thermal Power Plant) for regarding environmental clearance for capacity enhancement of TPP.
3.	161 of 2013 (original application no as 132 of 2013)	Exnora Green Pannal Vs Commissioner Pallavaram Municipality & Ors. 4 th respondent	Municipal solid waste dumping in lake.
4.	163 of 2013	M/s Chemplast Sanmar Vs CPCB 1 st & 3 rd Respondent	Against CPCB closure direction under Sec 5.
5.	172 of 2013	Tirupur Bleachers Association, Tirupur Vs Union of India & Ors 2 nd respondent	Bleaching units went against the TNPCB closure direction for achieving ZLD.
6.	187 of 2013	M/s Chetana Society Vs M/s Indian Immunologicals Ltd & Ors. 7 th and 8 th respondent	Against the industry operating without valid consents
7.	281 of 2013	People for Cattle in India Vs Commissioner Corporation of Chennai and Ors. 14 th respondent	Regarding illegal slaughtering in Chennai
8.	280 of 2013	SP.M.N.Umayal Achi, Panruti Vs The Collector, Cuddalore District and 7 Ors 4 th respondent	Regarding flour mill & Genset attached with telephone tower pollution

9.	Appeal No. 46 of 2013	Shree Consultant CBWTF, Mysore Vs Karnataka State Appellant Authority, Bengaluru 7 th respondent	Against KSPCB allowing one more unit (CBWTF) coming up with in 150 Km radius
10.	Appeal No. 47 of 2013		
High Court – Chennai			
11.	Writ Petition No.16463 of 2013	Sri. Ramesh Manikandan 1 st Respondent	Hygienic & pollution problem by Fast food shops (road shops)
12.	Writ Petition No.31119 of 2013		Construction of multi store building near Perungudi lake, Chennai
High Court Kerala			
13.	No. 17774 of 2013	Khader Yousuf Vs UOI & ors 4 th respondent	Regarding imported DG clearance
14.	Contempt Case (Civil) No. 308 of 2014	Khader Yousuf Vs Avinash Akolkar	Contempt Case Against the Judgment in W.P. (C). No. 29098/2013, dated 27 th November, 2013 related to imported DG clearance.
Hon'ble Court of III Additional Chief Metropolitan Magistrate at Gajuwaka, Vizag			
15.	DDR 8189 of 2013	M/s Hinduja National Power Corporation Ltd	Case has been filed for violating the provisions of E (P) A, 1986
Hon'ble High Court, Hyderabad			
16.	PIL No. 23 of 2014	Trust for Social Justice Vs The State of Andhra Pradesh & Ors 8 th respondent	Pollution problem due to flexi boards/banners

Participation as a member of different Environmental Committees

- Zonal Officer as a member of Laboratory committee of Karnataka State Pollution Board, Bengaluru is participating in various meetings as and when organized and providing the valuable inputs on various issues taken up in the committee.
- Zonal Officer as a member of Environmental Management & Policy Research Institute, Bengaluru and Department of Ecology and Environment, Bengaluru is participating in the meeting as and when called and providing inputs on different environmental issues discussed in the committee.

Public Complaints

Several VIP complaints/ representations in form of hard copy, email and as well as through telephone calls. The complaints are routinely investigated by this office itself or through

respective SPCB's. Around 23 complaints are received and regular follow-up is made for disposal.

Rajiv Gandhi Environment Award for Clean Technology

This office along with the officials from MoEF and H.O, Delhi has inspected M/s Jubillant Organosys Ltd, M/s Mangalore Chemicals & Fertilizers Ltd, M/s Bannari-Amman Sugars Ltd, M/s ITC, Bhadrachalam and M/s Nagarjuna Fertilizers Ltd for evaluation of National Environmental award and Rajiv Gandhi Award for Clean Technology during 2013-14.

Seeking Information under Right to Information Act, 2005

The queries received under RTI are appropriately replied within time frame as per norms. In case if CPCB is not party to that, then such issues are transferred to concerned departments to take necessary action. Nine RTI queries were addressed.

Parliament Questions

All parliament questions as received are replied within stipulated time. The entire staff will be in alert during parliament sessions.
