Kerala High Court
V.S. Damodaran Nair And Anr. vs State Of Kerala And Ors. on 7 April, 1995
Equivalent citations: AIR 1996 Ker 8
Author: Shanmugam
Bench: K Sreedharan, P Shanmugam
JUDGMENT

Shanmugam, J.

1. Since the issues involved in these original petitions are of great importance viewed from any angle, the matter was referred, according to the learned Judge, to be decided by a Bench of this Court by order dated 15-2-1991. Therefore the matter was posted before the Division Bench.

2. O. P. No. 6041 of 1981 was filed praying for the issue of a writ of mandamus to direct the 1st respondent to constitute a committee of experts to study the reasons for the poisonous fog formation in Cochin City and to suggest remedial measures. Learned single Judge by order dated 26-2-1986 directed the National Environmental Engineering Research Institute (NEERI) to investigate the air pollution within the city and surrounding areas and further called for reports from NEERI for any remedial measures and specifications envisaged for preventing air pollution. The NEERI submitted their final report on 29-8-1990. The learned single Judge by order dated 21-12-1990 after considering the final report of the NEERI and objections filed by the respondents issued further directions in the matter. These directions were issued to the Central Government and the Central Pollution Control Board, State Government and the various other industries in regard to the implementation of the standards prescribed by the expert committee. As these directions were not carried out, the Division Bench of this Court by order dated 28-2-1992 issued notice to the State Pollution Control Board. There was a further direction to the Central Pollution Control Board to show cause why action should not be taken, under the Contempt of Courts Act and further directed the Central and State Governments to file necessary information or counters in relation to the formation of green belt activity recommended by the expert body. After the statements having been filed, the above original petitions have been finally posted for disposal before us. The public interest litigation (O.P. No. 6041 of 1981) was instituted with a view to ensure healthy living and eradication of air pollution even though initially the provocation was the formation of fog in the city of Cochin. The scope of the writ petition was expanded by impleading industries and departments which were suspected to be the cause for the air pollution within the city and the adjoining areas of the city. An expert body like NEERI was entrusted with the work of study of the air pollution. Before the final stage of this report came into existence, two writ petitions linked with the problems involved in the larger reliefs had been filed and the Court delayed the execution of the directions passed by the learned single Judge. Ultimately NEERI has filed the final report on 29-8-1990. Objections were filed by the industries in detail against the report of the NEERI. The main findings and recommendations of the NEERI as contained in page 216 of the report are as follows:

"(1) Regular AAQM for SPM along with dust characterisation is essential in Udyoga-mandal region.

(2) There is higher contributions of organic fuel combustion based emissions.

(3) The levels in Cochin region of air borne particle size are well comparable to six major cities of U.S.A. There is a rising trend of trace metal concentration; it was reflective of an increase in urban activity, industrialisation, vehicular traffic, domestic traditional combustion and lowering of unpaved surfaces in the city.

(4) Excess lead additives in gasoline supplies of this region may not be required for climate and topography of Kerala. The most prone areas with higher SO2 levels are observed as Udyogamandal and Binanipuram. In Udyogamandal area, SO2 levels are to be kept under constant watch through regulatory agency.

(5) Ammonia is the most significant pollutant observed having higher concentrations. NH3 is emitted from larger fertilizer units of the city and under high humidity conditions, "which rolls down towards down wind direction particularly during inversion conditions when vertical diffusion is restricted." The frequency of high NH3 episodes "were low which speaks for itself. Ammonia emissions 'from production, transport, storage etc. into the atmosphere in Cochin region should be strictly avoided. Ambient air monitoring programme should be carried out systematically and continuously.

(6) "S" recovery and tail gas desulphurisation system is essential to overcome the problem of excess SO2 pollution. The old sulphuric acid plant at F.A.C.T., Udyoga-mandal should be converted to DCDA with acid mist eliminator. Subsidiary recommendations are contained in paragraph 12(ii) to (iv).

(7) Industrial units are major source of dust, oxides of sulphur and nitrogen ammonia and certain other pollutants; automobiles are the maj or sources of trace metals in ambient dust oxides of nitrogen, carbon monoxide and hydrocarbons.

(8) Two major industrial zones should be encircled by about 500-1000 mts. green belt as a barrier between industrial zone and major residential sectors. The free zones between different industrial units should also be covered by green belts.

(9) A regional approach to an overall problem is necessary. Source monitoring programme with regular frequency has to be carried out by neutral regulatory agency should be introduced. The violation of the prescribed limit should be kept under surveillance.

(10) Pollution from automobiles sources (the worst affected area being Kacheripadi junction of Kochi City) should be checked. Maintenance of motor vehicles should be enforced.

(11) Traffic pattern of the city itself should be studied and plans evolved "to avoid frequent stoppages (smooth traffic flow) and to minimise the travel time of vehicles on major roads."

The Senior Scientist and Head of the Pollution Control Board, New Delhi, filed an affidavit dated 23-3-1992. In the said affidavit a summary of the standards prescribed have been set out which were as follows:

"(a) Industry specific Emission Standard:

Industry specific Emission Standards are enforced for controlling the emission from the stick/Chimney of the industries. This is enforced by the State Pollution Control Board under Air Act. For fertiliser industry emission standard for ammonia as 360 mg/ NM3 have been set by Kerala State Pollution Control Board and presently being enforced through consent management.

(b) Work Place or Occupational Health Standard:

These standards are set to protect the workers* health from industrial pollution generated at work place (inside the factory). This is enforced under the Factories Act. Standards for ammonia and other pollutant in the work have been notified under the amended Factories Act, 1987. Standards for work place ammonia are as follows:

Threshold Limit Value (TLV) of Ammonia TLV -- 8 hrs/day, 5 days/week: 18 mg./M3.

(c) Ambient Air Quality Standards:

The Central Pollution Control Board in the year 1982, has, as per Section 16(2)(h) evolved the ambient air quality standard for criteria pollutant, that is for Sulphur Dioxide, Oxides of Nitrogen, Carbon Monoxide and suspended particulate matter. These pollutants are generally coming to the atmosphere from the common

industries and vehiculiar sources. Generally, all over the world, ambient air quality standards are set out for criteria pollutants (for example, Ambient Air Quality Standards of World Health Organisation, Environmental Protection Agency of U.S.A., Ambient Air Quality Standards of Japan, Australia, France, Italy etc.). Ambient air quality standards/ guidelines for specific pollutants like ammonia, chlorine, fluoride, etc. are to be set by local State Pollution Control Board where the problem exists. For example, standards for ammonia are to be set by State Pollution Control Board where fertilisers industries exists."

After setting out the standards it had been stated that the ambient air quality standards are not standards which are to be enforced. They are only objective or goal of pollution control. The standards which are to be enforced for Air Pollution Control is the emission standards which have already been set. The counter proceeds to state that apart from the industrial sources ammonia will be released from garbage, organic wastes, compost manures and fertiliser used by farmers, sewage effluent etc. The ambient air quality standards of ammonia was notified by the Kerala State Pollution Control Board in their notification dated 14-5-1992 under Section 17(1)(i) of the Air (Prevention and Control of Pollution) Act, 1981. According to the said notification, the limit prescribed was Mg/m3--400. The Kerala State Pollution Control Board has filed a statement setting out 11 names of industries for whom consent orders have been issued. A common counter was filed on behalf of the Commissioner and Secretary to Government, Health Department, Secretariat, dated 9-7-1993, stating that the emission standard to be achieved by the industries were laid down by the Board in the respective consent orders, which are reviewed and renewed from time to time. It is further stated that intensive monitoring of emission from the industries has been conducted as a special scheme for one year and the said report has been filed by the Senior Environmental Engineer, Kerala State Pollution Control Board, Ernakulam. The observations and the conclusions arrived at from the monitoring area are given in the said statement which are as follows:

"(1) Ammonia in the ambient air in the city is within the standard specified except at Eloor.

(2) At Eloor, the concentration of ammonia had exceeded the permissible level of 400 Mg/ M3 on three days during the last one year.

(3) Ammonia in the ambient air at Eloor was generally on the higher level, though within the permissible limit.

(4) Periodical higher concentration of ammonia was observed at Willingdon Island indicating the influence of ammonia storage and handling facilities there on the ambient air.

(5) Ammonia concentration at Irimbanam was lower than at all other stations during most of the days.

(6) The sampling station at Town Hall (Ernakulam North) is in between the monitoring stations at Eloor and Willingdon Island. The monitoring data shows a gradient from Eloor to Willingdon Island indicating the influence of the emission from the industries at Eloor on the ambient air quality in the city."

3. Respondents 2, 10 and 12 have filed their statement of objections in respect of the report filed by NEERI. In that it has been stated that the report filed by NEERI will be considered in the light of standards and limits set out in the book 'Air Pollution', edited by Arthur C. Stern. The standards were laid down for the United States by OSHA for various gases. The Indian Standards Code of safety for Ammonia gives in "Effects of various concentrations of Ammonia in Air". The statement further proceeds to state that certain very high figures which may be noticed occasionally should be ignored from consideration, as these happen generally only in such abnormal circumstances which are not common and for short duration. They also object to the testing being done from the Soil Testing Laboratory area. They also object to the dealing with the process with a plant which was scrapped as early as in 1985. It is stated that no industrial operation can discharge fresh air and fresh water in the environment. If the industries are to be established to raise the standard of living and make goods available to the people, certain pollution of environment may not be avoidable. The

question, therefore, is of the deg'ree up to which pollution could be tolerated in the larger interest without causing any harm. It is admitted that the industry, however, should try to use the best technology to come up to such standards to control pollution of environment. It is further admitted that no ready-made solutions are always available for all instances and their development takes time. If a solution is found, its implementation requires finance and time. Finally the counter states that the Company is in no way respon- sible for any of the complaints raised in the writ petition.

4. The 3rd respondent has also filed objections dated 17-12-1990. According to the counter, they said that they have taken steps to install a fuel gas desulphurisation plant. Storage tanks of other petroleum products cannot be connected to flare for reasons of safety, and that is the practice adopted in Refineries throughout the world.

5. Additional 11th respondent has filed a statement of objections dated 14-1-1991. In the counter it is stated that they obtained consent from the Kerala State Pollution Control Board and they have complied with all the conditions prescribed in the consent order.

6. Additional statement of objections was filed on behalf of respondents 2, 10 and 12 by Deputy General Manager, Technical, FACT, in respect of the report filed by NEERI, dated 2-1-1995, clarify certain developments which happened since the filing of the report and the statement of objections dated 17-12-1990. It is stated that since the date of the final report of NEERI, the 80 ton oil gasification plant has been completely scrapped and is not now functioning. The 130 ton oil gasification plant is used only on rare occasion. The other plant, viz., 120 ton ammonia (steam reforming process) plant is at present utilised for obtaining hydrogen up to a capacity of 75 tonnes and the balance alone is utilised for production of ammonia. According to the statement as against 340 tonnes of ammonia per day which was being produced in that area, at present the production is only at about 45 tonnes, reducing the ammonia in the ambient air. The statement further proceeds that the fixing of 400 micrograms per M3 by the Pollution Control Board has to be taken into account before considering the comments of NEERI because the earlier proposed standard by the Pollution Control Board was 100 micrograms per M3. The statement further sets out the steps that they have taken in accordance with the recommendations of NEERI.

7. Similarly respondent No. 3 has filed an additional statement dated 25-1-1995. The further steps taken are for satisfying the recommendations made by NEERI. Statements were made on behalf of the Corporation of Cochin dated 21-1-1991 stating that they are making every efforts to enforce the sanitary standards within the existing system. They also stated that the Sewers are under the control of the Kerala Water Authority and it is learnt that only a small part of the city has Sewer Lines. The Secretary to Government, Industries Department, filed a counter-affidavit dated 24-1-1991. The Secretary has stated that in a survey conducted in the industrial area of Cochin it was found that there are 55 registered Small Scale Industries Units of Ice Plants and they used ammonia for the purpose of refrigeration. Due to the loss caused because of wear and tear operation of such compressors, there is likelihood of leakage. But in the circumstances mentioned above the leakage would be very negligible. The statement further proceeded to say that the measurement of this leakage if any will be calculated by the Kerala Pollution Control Board and they will issue necessary directions if anything is found against the standard prescribed by them. It is also stated that they have not received any complaint so far about these industries. A common affidavit was filed on behalf of the State represented by Secretary to Government, Transport Department in reference to the action taken in the proposals, if any, for the control of the air pollution, especially the Transport Department. Rules 282 and 282(A) of the Kerala Vehicles Rules, 1961 as framed under the old Act, provides for checking emission of smoke, vapour or harmful substances. Rule 282 also restricts the use of adulterated fuel, besides the Government of Kerala issued G.O. (P) 170/86/PW & T, dated 27-1-1986 prescribing standards of air pollution by smoke density and carbon monoxide concentration. The control of pollution is directly brought under the Controller of the Kerala State Pollution Control Board. 35 testing centres throughout the State have been recommended and approved by the Government and there are 6 centres in Ernakulam District. According to the statement the Government have already taken all steps to control air pollution. After the commencement of the new Act in the year 1988, Rules 115 and 116 deal with the air pollution. As the officers of the Motor Vehicles Department and the Police Department are not trained

to take steps or the measures to check up the motor vehicles, the Government is considering the necessity of giving special training courses to these officers to check up the vehicles in implementation of the provisions of the Motor Vehicles Act and Rules. They have also pointed out all anomalies on the implementation of the Act and suggested amendments to cover the anomalies of the Central Act. A reading of the counter-affidavit shows that the Transport Department is at the initial stage of controlling the air pollution. A common counter-affidavit was filed on behalf of the City Commissioner of Police dated 30-1-1991 in reference to the report of the NEERI that the high level air pollution in the area could be attributed to several causes like traffic jam. Counter proceeds to state that the steps have been taken to remedy the situation. According to the counter they have given several suggestions and also set out the main suggestion like widening of M.G. Road, Sahodaran Road and Chittoor Road, construction of bus bays at the main stops etc. It has been stated that even with the available facilities to the traffic wing and the existing road system, the traffic wing is doing the best of its service to control the traffic system in the area. A common affidavit sworn by the Section Officer on behalf of the Secretary to Government, Public Works (R) Department was filed on 18-2-1991. In this a detailed statement has been made regarding the maintenance of all improvements and laying down the roads. It has been stated that proposals are pending to improve the old National Highway to 4 lanes standard besides various other proposals to release the accute traffic conjunction now being felt in the Cochin city. A copy of the minutes of the meeting to review the work of Public Works Department Roads Wing in Cochin city held on 22-11-1990 was filed before this Court. The minutes have set out the details of the decisions taken to implement the proposals set out thereunder.

8. We have gone through the reports submitted by NEERI, the objections and the statements filed by the respondents setting out the steps that they have taken to implement the recommendations of the expert Body.

9. Air Pollution has been defined under the Air (Prevention and Control of Pollution) Act, 1981 (hereinafter referred to as 'the Act') as follows:

" 'air pollution' means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment."

According to U.S. Department of Health, Education and Welfare, air pollution has been defined as "The presence in the outdoor atmosphere of one or more contaminants or combinations thereof in such quantities and of such duration as may be, or may tend to be injurious to human, plant or animal life or property or which unreasonably interfere with the comfortable enjoyment of life or property or conduct of business." Under Section 19 of the Act the State Government is empowered to declare any area within the State as air pollution control area. Section 21 prohibits the establishment or operation of industrial plants in an air pollution control area without the previous consent of the State Board. Sections 16(2)(h) and I7(l)(g) empower the Central Board and the State Boards to lay down standards for the quality of air, standards for emission of air pollutants into the atmosphere from industrial plants and automobiles or for the discharge of any air pollutant into the atmosphere. Section 22 of the Act prohibits the discharge of air pollutant in excess of the standards laid down by the State Board under Section 17. Section 31-A enables the Central Board to issue directions regarding closure, prohibition or regulation of any industry. Sections 37, 38 and 39 provide penalties for failure to comply with the provisions of the Act.

10. The Central Government has also passed an Act to provide for the protection and improvement of environment called the Environment (Protection) Act, 1986. Under Section 3 of the Act, the State Government, officers and other authorities are to lay down standards for emission or discharge of environmental pollutants from various sources whatsoever. The section further provides for inspection and issue of further directions to prevent, control and abatement of environmental pollution. Section 7 prohibits the emission or discharge of environmental pollutants in excess of such standards as may be prescribed. Section 5 empowers the Central Government to give directions including the closure or prohibition of industry. Section 15 provides for punishment for violation of the rules which may extend to five years'

imprisonment or fine which may extend to one lakh rupees, with additional fine which may extend to five thousand rupees for every day during which such failure or contravention continues after the conviction for the first such failure or contravention.

11. Article 48A of the Constitution, the Directive Principle, enjoins that "The State shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country", and Article 51-A(g) which proclaims it to be the fundamental duty of every citizen of India "to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures."

12. We are concerned with air pollution, Air pollution adversely affects human being and their environment. The extent of air pollution depends heavily on how weather disposes of the pollutants. The ability of the atmosphere to dilute and disperse them is limited to two factors -- wind speed and the depth in the atmosphere to which air near the surface can be mixed. Although considerable variation occurs from day to day in the extent to which these factors disperse air pollution, the same patterns tend to repeat themselves over months or years. On some few days in a year, strong winds and highly unstable atmospheric conditions may disperse even the heaviest blanket of pollution. On many other days, weak winds and highly stable conditions let small quantities of pollutants accumulate and build up to serious proportions. It is stated that many cities like in natural basins at the confluence of rivers, around bays, or in flat areas backed against mountains, such basins are natural gathering places for low-lying masses of warm air, which trap pollutants in the familiar phenomenon known as "inversion". The Cochin city and surrounding areas are situated in such a way that the possibility of inversions taking place is quite often and natural. Consequently the pollution in Cochin and other adjoining areas should be considered in the light of its position. The various sources of air pollution caused in Cochin are from industrial plants, motor vehicles, sewers and domestic drains emanating foul gases. Some of the major pollutants are ammonia, sulphur dioxide, carbon monoxide, nitrogen dioxide etc. The main sources for these pollutants are ammonia manufacturing plants, fertilizer plants, sulphuric acid manufacturing plants, fuel burning processes, metallurgical industry, petrochemical industry, nitric acid manufacturing, nitration processes, combustion processes and metallurgical industries respectively. Air pollutants are in the form of smoke, fume, dust, odour, gas etc. Of these the main classification that is alleged in this case are smoke, fume, dust, odour and gases. It is an admitted case that air pollutants are causing serious health hazards like eye irritation, vegetation damage, further causing respiratory diseases and other harmful effects to human being and vegetation.

13. The Government of Kerala has notified under Section 19(1) of the Air (Prevention and Control of Pollution) Act, 1981 dated 31-7-1984 declaring the area coming under the Corporation of Cochin as an Air Pollution Control Area KEA No. 1.

14. The Executive Engineer, Air Pollu- tion Control Cell of the Kerala State Pollution Control Board submitted a detailed report as per the directions of this Court. The report has given a background of the unusual phenomena called Smog in the city of Cochin. After giving the topographical and climato-logical features of the Cochin city and locations of industries, the report further traces out the air pollution control activities in Cochin area. The report also furnishes the ambient air quality study and results of its programme. A list of industries having serious and major sources of pollution and the status of air pollution and control measures are given below:

1 (a). M/s. F.A.C.T. Ltd., Cochin Division.

The Company could not achieve fully the standards laid down by the Board.

l(b). Emission Characteristics of M/s. F.A.C.T. Ltd., Cochin Division, Ambalamedu.

Time given up to 30-11-1988 to provide necessary control equipments. Legal proceedings will be initiated, if they fail to achieve the standards.

2(a). M/s. Cochin Refineries Ltd. Ambalamugal.

The claim of the Company that the emissions are within limits is not true.

2(b). Emission Characteristics of M/s. Cochin Refineries Ltd., Ambalamugal.

No effective steps taken to control the main pollutants. The Board will not grant consent till they submit a definite proposal for emission control.

3(a). M/s. Carbon and Chemicals India Ltd., Karimugal.

The effectiveness of the system installed by the Company is being evaluated.

3(b). Emission Characteristics of M/s. Carbon and Chemicals India Ltd., Karimugal.

Performance of the existing system is being evaluated. Legal steps will be initiated if they fail to meet the emission standards.

4. M/s. Hindustan Organic Chemicals Ltd., Ambalamugal.

Emissions are within limits.

5(a). M/s. F.A.C.T. Ltd., Udyogamandal.

The Company failed to complete even the partial pollution control proposals. The pollution problems due to this factory are still alarming.

5(b). Emission Characteristics of M/s. F.A.C.T. Ltd., Udyogamandal.

The Board is planning to take serious action after 30-11-1988 to implement MINAS standards.

6(a). M/s. Indian Rare Earths Ltd., Udyogamandal.

Being evaluated.

6(b). Emission Characteristics of M/s. Indian Rare Earths Ltd., Udyogamandal.

Direction issued to maintain the standards. If they fail, legal action will be initiated. Consent renewed up to 6-2-1991.

7(a). M/s. Travancore-Cochin Chemicals Ltd., Udyogamandal.

The level of Mercury and its compound as well as Chlorine and its compound exceeded the limit specified.

7(b). Emission Characteristics of M/s. Travancore-Cochin Chemicals Ltd., Udyogamandal.

As the Company is taking negative attitude, necessary steps including legal action will be initiated if they fail to meet the requirements of the consent.

8. M/s. Cominco Binani Zinc Ltd., Edayar.

Emissions are within the limits and its pollution is being evaluated.

9(a). M/s. Hindustan Insecticides Ltd., Udyogamandal.

The Company did not submit any proposal for emission control even though the emissions were outside the limits specified by the Board. Being evaluated.

9(b). Emission Characteristics of M/s. Hindustan Insecticides Ltd. Udyogamandal,

The Company failed to provide adequate control measures. Necessary action, including legal steps will be initiated, if they fail to meet the requirements of the consent.

10(a): M/s. Carborandum Universal Ltd., Kalamassery.

The Company had not done anything to control emisisons. Being evaluated.

10(b). Emission Characteristics of M/s. Carborandum Universal Ltd., Kalamassery.

Considering the poor performance, the request for renewal of consent was not granted so far.

11(a). M/s. Indian Aluminium Co., Kalamassery.

The Company had not taken any steps to control emissions. Being evaluated,

11 (b). Emission Characteristics of M/s. Indian Aluminium Company, Kalamassery.

Consent renewed up to 6-2-1991. The emissions are being closely watched for necessary action, if they fail to provide the control measures within a reasonable time.

15. Apart from the 11 industries the Board has granted consent to 15 major and medium industries in Cochin area specifying conditions regarding the quality and quantity of emissions. The report further furnishes the results of the ambient air quality study. Finally the report ends with the following conclusions:

"7. CONCLUSION : Based on the monitoring work and results arrived at with the limited manpower and infrastructure it can be concluded that the presence of Ammonia in humid winter conditions is one of the cause of the often seen fog in Cochin city. The part played by Sulphur dioxide and Oxides of Nitrogen cannot be ruled out, but its role in the formation of the peculiar fog at Cochin could not be precisely estimated. According to the studies and the results obtained and correlating this with the local environmental factors, a reasonable assumption can be arrived at that the ammonia borne air is being transported to the city by the land breeze from the Ambalamedu Industrial Area. This assumption does not mean that the industries in Eloor area are not creating any air pollution. The industries in Eloor industrial area are creating much more pollution, but its impact is in the environment immediate to them.

The study also revealed that the phenomenon of fog formation in the early morning which spouted out in the early eighties and which was a regular feature for about five years is on a declining trend. This is attributed due to the control measures adopted by certain industries in this area by the constant vigil and efforts effected by Kerala State Pollution Control Board. This phenomenon can be bring down further if all the industries in the Cochin area adopt proper control measures and by implementing the automobile pollution control programme."

The report has also annexed the emission standards for various industries and list of air polluting industries in Cochin area.

16. Apart from the above report on air pollution, the National Environmental Engineering Research Institute (NEERI), Nagpur has also conducted a useful study and submitted a valuable report. It is worthwhile to extract the conclusions and recommendations which are as follows:

"GENERAL CONCLUSION AND RECOMMENDATIONS :

1. The AAQMN Studies carried out for Cochin region revealed that: in general, the average SPM levels at most of the sites did not exceed 200 ug/m3 (95 percentile) which is the stipulated limit promulgated by CPCB. However, Udyogamandal area showed higher levels of SPM. The two sites namely FACT- Floor (Stations No. 13) and Eloor (Station No. 18) recorded single maximum value of 470 ug/m3 and 410 ug/m3 respectively. Though, general SPM levels do not cross the mark of 200 ug/ m3 (95 percentile) for residential zones and 500 ug/m3 (95 percentile) for industrial zones but in a coastal city these limits need revision because, for such coastal cities major contribution of dust is from anthropogenic sources whereas in other urban centres located in inland or arid zones higher SPM levels have been recommended because of higher contribution from background sources. Hence, regular AAQM for SPM along with dust characterisation is essential for industrial area of Udyogamandal region.

2. The volatile matter content of dust ranged between 40 to 75%. Residential zone revealed higher volatile matter levels than zones influenced by commercial and industrial activities. Higher volatile fractions of dust clearly reflect proportionally higher contributions of organic fuel combustion based emission including internal combustion engine,

3. Air borne particle size was also studied for the critical winter season for residential, commercial and industrial zones of Cochin region. Residential and Commercial zones revealed that the percent of particle mass less than 2.0 micron (which is respirable fraction penetrating deep in the lungs leading to respiratory disorders) was around 78% and 77% respectively. These levels in Cochin region are well comparable to six major cities of USA and again it indicates higher percentage contribution from man made sources of the regions because as bi-modal theory particles 2-4 micron primarily come from industrial/ commercial activities or fuel combustion sources.

4. Trace metal contents of dust for Cochin region reflected that average concentration of the toxic trace metals was maximum during winter 1989. Lead, Cadmium, Chromium, Zinc, Iron, Manganese, Copper and Nickel were the major metals studied. The results further revealed a rising trend of trace metal concentration though the SPM concentrations were declining reflecting increase in urban activity, industralization, vehicular traffic, domestic traditional combustion and lowering of unpaved surfaces in the city or this phenomenon can also be due to climatic conditions. Maximum levels of SPM lead content 0.798 ug/m3 and cadmium 1.142 ug/m3 were observed during this period. Here, it is pertinent to mention that excess lead additives in gasoline supplies of this region may not be required for claimate and topography of Kerala.

5. SO2 levels of eleven out of 20 sampling stations were less than 80 ug/m3 (95 percentile) which is the limit set up by CPCB. The most prone areas with higher SO2 levels observed are Udyogamandal and Binanipuram, where maximum single value as high as 381 and 242 ug/m3 respectively were recorded. Even in few other sites the maximum single value for SO2 concentration exceeded the promulgated limit. In the Udyogamandal area, SO2 levels are to be kept under constant watch through regulatory agency.

6. The results of NO2 monitoring showed that it does not pose any problem in the region perhaps because of low level of diesel powered vehicles-and also for higher size industrial furnaces with operating temperature 1400oC.

7. Ammonia is the most significant pollutant observed having higher concentrations. The frequency of occurrence of high concentrations of ammonia above 100 ug/ m3, which is the stipulated standard level proposed by KSPCB, was quite often. Even the single value as 907 ug/m3 was recorded in Udyogamandal

area. These areas represented by stations: 13 and 18 showed high ammonia levels, the value of 100 ug/m3 was exceeded atleast for 10% of the times, indicating that the zones fall under major NH3 polluted area while other areas recorded NH3 pollution to a lower degree. It may be pertinent to mention that NH3 is emitted from large fertilizer units of the city and under high humidity conditions are converted to white heavy fumes which roll down towards down wind direction particularly during inversion conditions when verticle diffusion is restricted. Hence, in Cochin certain areas were coming under direct influence of NH3 release. Fortunately, during this study period when a close watch was kept/the frequency of high NH3 episodes were low which speaks for itself.

8. Studies on smog phenomenon revealed that high levels of ammonia during stable conditions combined with fog to form, "Ammonia Smog"; with smell of ammonia and affecting visibility thereby hampering traffic movements. Ammonia emissions from production, transport, storage and handling etc. the atmosphere in Cochin region should be strictly avoided by the concerned authorities in order to prevent white "smog phenomenon" in Clochin.

9. Ambient air monitoring programme should be carried out systematically and continuously by the regulatory agencies which will enable to take action appropriate control measures.

10. As CRL, is refining all types of crudes even with supplies from Arabian countries with higher "S" percentage in oil, in such conditions "S" recovery and tail gas desul-phusization system is essential to overcome the problem of excess SO2 pollution. Though, whenever Bombay high crude is processed, SO2 release rate shall be less. Further, control on fuel use in process boilers should be LSHS or sweet gas. All storage tanks should be connected with flare and should be of floating roof type with minimum HC release. At this stage techno economical study on tail gas treatment should also be initiated as Bombay High crude supplies cannot be guaranteed on regular basis.

11. All the units of TCC were in compliance with the emission standers laid down by KSPCB during the study period but studies for installing tail gas treatment (scrubbing) units should be initiated particularly for emergency conditions.

12. At FACT, Udyogamandal:

(i) the old sulphuric acid plant (SCSA) should be converted to DCDA with acid mis eliminator and tail gas treatment is also desirable. Whereas the present DCDA plant must also be operated under optimal conditions so that it always meets the standards. Techno-economical studies should be initiated for tail gas treatments.

(ii) LSHS or other low "S" fuel may be used in boiler to further reduce SO2 emissions.

(iii) excess ammonia emissions should be prevented forthwith and an ammonia scrubber for all possible NH2 sources should be installed.

(iv) dust levels from rock grinding unil should be controlled by installing high efficiency multi cyclone or appropriate bag filter assembly.

13. From FACT Cochin' Division all possible ammonia leakages during its production, transport and storage should be avoided.

14. The emission inventory compiled for Cochin Region revealed that industrial units are the major sources of dust, oxides of sulphur and nitrogen, ammonia and certain other pollutants, while automobiles are the major sources of trace metals in ambient dust, oxides of nitrogen, carbon monoxide and hydrocarbons.

15. Two major industrial zones should be encircled by about 500-1000 mts. green belt as a barrier between industrial zone and major residential sectors so that any pollutant released during normal or emergency period (abnormal operation) are attenuated and trapped. The free zones between different industrial units should also be covered by green belts. These measures are possible only when regional approach to an overall problem is adopted.

16. Source monitoring programme with regular frequency has to be carried out by a neutral regulatory agency and the sources violating the prescribed limit are to be kept under surveillance.

17. Pollution from automobile sources is also significant. Kacheripadi junction is the most affected area by auto pollution. The permissible limits fixed by CPCB for vehicular emissions (which primarily require proper maintenance of vehicles) should be enforced in Cochin city so that auto exhaust pollution is prevented. The traffic pattern of the whole city should be studied and detailed plans may be prepared to avoid frequent stoppages (smooth traffic flow) and to minimise the travel time of vehicles on major roads.

18. Finally, a regional comprehensive study based on carrying capacity of the whole Cochin zone should be undertaken by the local Urban Development Body so that sustainable development and urban growth of region is ensured, without any ecological problems."

As per these conclusions it is clear that the air borne particle size levels in Cochin region are comparable to six major cities of USA indicating higher percentage contribution from man made sources of the region. In order to contain trace metal contents of dust for Cochin region, it is recommended that excess lead additives in gasoline supplies of this region may not be required for climate and topography of Kerala. Ammonia is considered as most significant pollutant having higher concetration indicating that the zones fall under major ammonia polluted area. Ammonia which is emitted from large fertilizer units of the city and under high humidity conditions is converted into white heavy fumes which rolls down towards down wind direction particularly during inversion conditions when verticle diffusion is restricted. Hence according to the conclusion in Cochin certain areas were coming under direct influence of ammonia release. As per the report the studies revealed that high levels of ammonia during stable conditions combined with fog to form "Ammonia Smog" with the smell of ammonia and affecting visibility thereby hampering traffic movements.

17. Counter-affidavits and statement of objections were filed on behalf of all 'the respondents. It was also argued by the learned counsel appearing on behalf of the respondents that their factories have conformed to the standards prescribed and the emissions from their factories were within the norms prescribed by the Government. They have further submitted that they are taking all precautions necessary to see that there is no air pollution caused because of their industries. Pointing out the permissible limits of the various factors like presence of ammonia, it was submitted that these pollutants are within the normal prescribed standard levels.

18. Considering the complicated technical nature of the issues involved we may have to be guided by the authoritative reports submitted by the National Environmental Engineering Research Institute (NEERI) and the State Pollution Control Board. It is further to be borne in mind that the air pollution and the pollutants causing pollution should be studied in the lie of the geographical location of the particular area and in the light of the expert study conducted by the competent groups. Fortunately, by virtue of the orders passed by this Hon'ble Court and effective steps taken, we have before us a comprehensive and expert report on the various aspects of air pollution. It is also an admitted fact that the major industries which have been granted consent under the Act on conditions, have to company with those conditions within the time prescribed for renewing the consent orders. We find from the report of the Executive Engineer, Air Pollution Control Cell of the Kerala State Pollution Control Board a detailed study on the problem of smog experienced in Cochin city and the course of action indicated by them. The said study more or less compares with the report of the NEERI.

19. We have also found from the reports of both these expert bodies that some of the major industries are yet to comply with the conditions of the consent orders. Similarly the Corporation of Cochin and the State

Government are yet to make effective steps for the control of pollution. We are disappointed with the performance of the Corporation in this regard. As a matter of fact, nobody appeared on behalf of the Corporation. The statement filed on behalf of the Corporation is also vague and disappointing.

The stand fo the Corporation is that they do not have any expert Environmental Engineer and instruments for monitoring gas levels of the atmosphere. According to the statement the Sewers are under the Control of the Kerala Water Authority and it was learnt, according to them, that a small part of the city has Sewer Lines. It is further stated that the Corporation is taking steps to work in co-operation with the above authorities and to ensure that air pollution is effectively prevented. The said stand of the Corporation is least excepted from an important Corporation like Cochin as against the serious air pollution affecting the life and security of the people of Cochin area. It is one of the findings in the report that the emission of gases from the open sewers is one of the major air pollutant and no steps have been taken to close the sewer lines. The whole city of Cochin has open sewerage lines and consequently let in to the vast open canal, allowing the sewerage and other waste dumped in the canal lying stagnant causing serious hazard to the health. The inaction on the part of the the Corporation in this regard is to be strongly deprecated.

20. Even in the earlier order passed by the learned single Judge dated 21-12-1990 it has been stated that the Kochi Corporation has not evinced a serious concern in the matter. Learned judge further stated that its efficiency and effectiveness in dealing with environmental problems is yet to be demonstrated. The Kochi Corporation in spite of this specific direction by the learned single Judge has not come forward with clear statement as to the state of affairs regarding preventive measures on pollution. In the affidavit filed by the Senior Scientist of the Central Pollution Control Board, New Delhi, dated 23-3-1992 it has been stated that apart from the industrial sources, ammonia will be released from garbage, organic wastes, compost manures and fertiliser used by farmers, sewage effluent etc. It is an admitted fact by the Corporation that there is an open sewage system in the city of Cochin and that the sewage along with the garbage dumped are permitted to stagnate in the open canal. Therefore it is clear that the Corporation has failed its duty in managing the pollution.

21. The statement made on behalf of the Government in the counter-affidavits that steps are being taken for controlling motor vehicle pollution and the statement made by the City Police Commissioner to regulate the traffic for effective prevention of air polluation are to be carried out as promised by them in their statements.

22. In the common affidavit filed on behalf of the State of Kerala represented by Secretary to Government, Transport Department, Secretariat, Thiruvananthpuram, it is admitted in reference to emission of smoke by the vehicles that the test result will show that these vehicles are violating the rules. The affidavit has pointed out certain anomalies said to have been found in the working of the New Motor Vehicles Act and the proposal of the Government for effective implementations of the provisions of the Act. On the contrary in the report submitted by the Executive Engineer, AIR Pollution Control Cell of the Kerala State Pollution Control Board as the 6th respondent in the above matter has stated that in order to control pollution from the automobiles the State Government in consultation with the Board had made amendments in the Kerala State Motor Vehicles Act incorporating emission standards. It is specifically stated that the enforcement of these Rules will be started immediately. They also admitted that they have got testing facility to manage the exhaust limits permissible.

23. One of the admitted fact is that the slow moving traffic due to bottlenecks or for any other reason is one of the sources for air pollution. The affidavits filed by the Assistant Commissioner has set out various proposals to be undertaken for the purpose of reducing congestion and pollution. Till these final proposals are going to be implemented, the authority should reduce the traffic congestion to the maximum extent possible by scientific regulation of traffic. It is found that the permission of two way traffic even in narrow lines and the permission of the U turns at the entries and exit of over bridges hold up traffic constantly causing voluminous air pollution. It is to be noted that in view of geographical location of the city of Cochin even the nominal increase of the pollutants will creats serious pollution.

Therefore it is for that purpose the air pollution must be prohibited to the maximum extent possible.

24. The objections submitted on behalf of the respondents to the report of the NEERI and the report of the Pollution Control Board are not sustainable. The report of NEERI is in specific reference to Cochin city. The objections raised by the respondents are based on their own assessment and textbook and studies of the areas other than Cochin. Therefore, we accept the report of NEERI and objections to it are not valid. According to us the reports submitted by 'NEERI' and the State Pollution Control Board are comprehensive and authoritative. We accept the conclusions and the findings in the reports as binding and are to be accepted.

25. The conclusion and recommendations of the NEERI are to be followed for maintaining the Cochin area clear of pollution. In our view these conclusions and recommendations are to be considered by the Pollution Control Board as to form part of the conditions for granting consent orders. Some of the recommendations of the NEERI are to be carried out by the State Government and the other departments. For instance under recommendation No. 4 it is stated that excess lead additives in gasoline supplies of this region may not be required for climate and topography of Kerala. Under recommendation No. 17 it is stated that the traffic pattern of the whole city should be studied and detailed plans may be prepared to avoid frequent stoppages (smooth traffic flow) and to minimise the travel time of vehicles on major roads. Under recommendation No. 18 it is stated that a regional comprehensive study based on carrying capacity of the whole Cochin Zone should be considered by the local Urban Development Body so that sustainable development and urban growth of region is ensured without any ecological problems. Thus the concerned parties like the State Government and respective departments including the Corporation of Cochin are directed to carry out the recommendations of the NEERI report so as to ensure pollution free living for people of Cochin.

26. The Central Acts viz. the AIR (Prevention & Control of Pollution) Act. 1981 and the Environment (Protection) Act, 1986 have effective system of regulation, control and measures to penalise for failure to comply with the provisions of the Act. As stated on behalf of the State Pollution Control Board that they are evaluating constantly the performance of the industries which are emitting pollutants and actions in the form of refusing consent and directions as contemplated under the Acts are being taken, as referred in para 14. However, we may hasten to add that the valuable reports and the recommendations made after a detailed study and survey should be effectively implemented and carried out. In that view of the matter we hereby direct the additional respondent No. 6 to monitor and evaluate the performance of the industries and also the Corporation of Cochin and other bodies who are responsible in containing the air pollution in and around the city of Cochin and submit yearly reports on or before 31st December of the year, of the action taken in this regard to this Court. The first such report should be filed before 31st December, 1995. We further make it clear that the recommendations made by NEERI and the State Pollution Control Board are binding on all the parties. They shall implement the recommendation within a reasonable time. The yearly report to be submitted by the 6th respondent will contain steps taken by various authorities and bodies in this regard. We consider that adequate steps and safeguards should be taken effective by issue of suitable orders under the Air (Prevention & Control of Pollution) Act, 1981 and the Environment (Protection) Act, 1986.

27. In the above circumstances we issue the following directions:

(1) The 6th respondent is directed to monitor the implementation of the conditions imposed in the consent orders to the various industries and see the conditions are complied with before the consent orders are renewed yearly;

(2) The 6th respondent is to submit yearly reports on or before 31st December every year before this Court in this regard ;

(3) The 6th respondent should die interim report, if necessary in reference to the pollution if the circumstances so warrant;

(4) The Commissioner, Corporation of Cochin, is directed to take immediate steps to maintain the open sewage canal and prevent the dumping of the garbage in the open sewage canal by effective steps.

(5) The Corporation of Cochin is directed to take urgent steps to lay down underground sewage pipes;

(6) The State Government is directed to take immediate steps to implement the rules regarding automobile exhaust fumes causing air pollution;

(7) The State Government should implement the recommendations of NEERI for prevention of air pollution by providing green 'belt barriers between the industrial zone and residential sectors without delay.

With the above directions the Original Petitions are disposed of. The parties are to bear their respective costs.