

**ENVIRONMENT IMPACT ASSESSMENT REPORT
ON ELOOR - EDAYAR 2004 - 2006**



Submitted to
Supreme Court Monitoring Committee
by
Local Area Environment Committee - Kochi

SUPREME COURT MONITORING COMMITTEE

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LOCAL AREA ENVIRONMENTAL COMMITTEE FOR ELOOR-EDAYAR AREA (LAEC)

(Constituted as per the order No. PCB/HO/HWM/SCMC/503/2004 dated 15.10.2004)
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(Small Scale Industry)



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(Edayar Small Scale Industry Assn.)



Shri. V. Satheeshan
(Confederation of Indian
Industries)



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FORWARD NOTE OF THE CHAIRMAN

LOCAL AREA ENVIRONMENTAL COMMITTEE was constituted by the Kerala State Pollution Control Board in compliance of the direction issued by the Supreme Court Monitoring Committee. The Hon'ble Supreme Court of India in Writ Petition No.657/95 (Research Foundation for Science Technology National Resource Policy Vs. Union of India & Another), having great concern over the violation of environmental laws and indiscriminate handling of hazardous waste causing irreversible damage to the environment, had appointed a High Power Committee with Prof. MGK Menon as its Chairman to examine all matters in depth relating to hazardous waste in and order dated 13-10-97. The Hon'ble Supreme Court sought report on following aspects among other 14 items terms of reference.

“ What are the changes required in the existing laws to regulate the functioning of units handling hazardous wastes and for protecting the people (including workers in the factory) from environmental hazards.

To assess the adequacy of the existing facilities for disposal of hazardous wastes in an environmentally sound manner and to make recommendations about the most suitable manner for disposal of hazardous wastes.

What is further required to be done to effectively prohibit, monitor and regulate the functioning of units handling hazardous wastes keeping in view the existing body of laws.

To make recommendations as to what should be the prerequisites for issuance of authorization/permission under Rule 5 and Rule 11 of the Hazardous Wastes (Management and Handling) Rules, 1989.

To identify the criteria for designation of areas for locating units handling hazardous wastes and waste disposal sites.

To determine as to whether the authorization/permissions given by the State Boards for handling hazardous wastes are in accordance with Rule 5 (4) and Rule 11 of Hazardous Waste Rules, 1989 and whether the decision of the State Pollution Control Boards is based on any prescribed procedure of checklist.

To recommend a mechanism for publication of inventory at regular intervals giving are-wise information about the level and nature of hazardous wastes.

What should be the framework for reducing risks to environment and public health by stronger regulation and by promoting production methods and products, which are ecologically friendly and thus reduce the production of toxics?

To consider any other related area as the Committee may deem fit.”

The High Powered Committee submitted its report before the Hon'ble Supreme Court .It considered the report and heard the Central Pollution Control Board, State Pollution Control Boards, and Government of India. The Hon'ble Supreme Court thereafter issued various directions to Union of India and State Pollution Control Boards to ensure compliance of environmental laws in its anxiety to protect the environment. The Apex court under the said order (dated 14.10.03) also constituted a Monitoring Committee to oversee that the directions issued by it are implemented timely and without any laxity or delay. The Monitoring Committee was also empowered to co-opt or constitute any authority, as the Committee may deem fit and proper to make its task easy.

The Supreme Court Monitoring Committee visited Kerala in August 2004 to assess the progress of the implementation of the directions issued by the Hon'ble Supreme Court. To its shock, the industries were found observing environmental laws more in breach not to speak of the provisions of Hazardous Wastes (Management and Handling) Rules. It found the river Periyar being converted into a canal carrying trade effluent endangering the major source of the drinking water. Alarmed by the sorry state of affair, the Supreme Court Monitoring Committee directed the State Pollution Control Board to issue orders of closure of all units functioning without authorization under the Hazardous Wastes (Management and Handling) Rules, despite the directions issued by the Hon'ble Supreme Court. Supreme Court Monitoring Committee also directed the Board to constitute a Local Area Environment Committee for Eloor-Edayar industrial belt to conduct an audit of industries functioning in the riverbank and suggest remedial measures including measures for reviving river Periyar.

The State Pollution Control Board on 15.10.04 constituted the Local Area Environment Committee. The Committee held its 1st meeting on 25.10.04. It started inspecting industries one by one as part of auditing 233 units producing a wide range of products of chemicals, non chemicals, etc. The nature of industries in the area being different, each industry had to be studied independently for the environmental problems posed by these units being distinct and unique.

The Local Area Environment Committee was constituted with representatives of all stakeholders such as Confederation of Indian Industries, Kerala Small Scale Industries Associations, Kerala Management Associations, Periyar Malineekarana Virudha Samithi(PMVS) & Peoples Union For Civil Liberties,(PUCL Kerala,. The State Pollution Control Board also deputed the officials namely Smt. D. Chithra Kumari, Environmental Engineer, Mr. K.S. Soman, Assistant Environmental Engineer and Mr.K.V. Shanavas, Assistant Scientist to assist the Committee. A vehicle with a driver was also made at the disposal of the Committee. The Committee also constituted a panel of Scientists for seeking guidance as and when required. It consisted of Pro. M.K. Prasad, former Pro-Vice Chancellor, Calicut University, Dr. Chandramohan Kumar, School of Marine Science, CUSAT, Dr. B. Madusudanakurup, School of Industrial Fisheries, CUSAT, Dr. V.N. Shivasankara Pillai, Department of Chemistry, CUSAT, Dr. C. Jayakumar and Mr. R. Sredar from Thanal, Dr. C.M. Joy, Reader S.H. College, Thevara, and Dr. M.L. Joseph, St. Alberts College.

The Committee submitted its environmental audit report 2004-05 to the Supreme Court Monitoring Committee on 8.10.05. The said report has been accepted by the Supreme Monitoring Committee and was appreciated as an “exemplary document” with “no present parallel”.

The Committee thereafter undertook the task of assessing the present status of Eloor Edayar, a task entrusted to it under the reference order. An environment impact study was undertaken. Committee owing to the short duration at its disposal opted to restrict its study to the impact on environment by the presence of heavy metals like Zinc, Lead, Nickel, Cadmium, Copper and Chromium and Iron. In view of presence of pesticide manufacturing units, limited study extended to pesticides also.

The study being limited to only few metals and pesticides, the true and actual extent of environmental damage caused by the polluting units could not be fully ascertained. However the result of even this limited study gives a very deplorable picture of Eloor-Edayar demanding immediate attention to arrest further deterioration. In this context, the committee's recommendations assume importance. The findings of the environmental impact study reiterate the necessity of implementing the recommendations of the Committee to save Eloor-Edayar from being rendered totally uninhabitable and river Periyar, a dead stream. To refresh the memory, the general recommendations and recommendations with specific reference to river Periyar are extracted below.

“ General Recommendations.

1. Eloor Edayar industrial belts has many minor, medium and major Chemical Industries dealing in highly toxic and explosive material. The area is a storage place of many materials of mass destruction. A Comprehensive Chemical Disaster Management plan involving the district administration, Factories and Boilers, KSPCB and Local Bodies and NGO's has to be evolved and implemented immediately as mandated under the Chemical Accidents (Emergency Planning, Preparedness & Responses) Rules, 1996.
2. KSPCB shall open an office at Eloor-Edayar industrial belt conferring the status of a district office with necessary infrastructure and entrust the administration of the Regional Office, Ernakulam. The staff strength at regional office falls short of the sanctioned post. This is in turn affecting the functioning of the Board especially in the matters namely, processing the application for consent / renewal, inspection of factories, stack monitoring work, investigation into the complaints etc.
3. PCB should undertake the exercise of revising the parameters issued to each chemical industries in Eloor Edayar area unit by unit and include the parameters which are necessary, having regard to the nature of product, raw materials, intermediate products, and the effluent generated by the concerned units. LAEC reports on each company may be considered while fixing the parameters. The parameters now mentioned in the consent orders fall short of many important factors.

4. Pollution Control Board should undertake periodical stack monitoring, noise level monitoring, ambient air quality monitoring, effluent/water quality monitoring in Eloor Edayar industrial belt for which a separate monitoring wing has to be constituted. The said wing should be provided with vehicles, monitoring equipments, mobile monitoring unit for round the clock monitoring and surprise inspections.

5. LAEC conducted a survey and took sample from various places such as Edayattuchal, Chakkarachal and other surrounding areas in Edayar and Amanthuruth Paddy Field, and surroundings areas of Kuzhikkandom Creek in Eloor. These areas are found with persistent Organic Pollutants, chemicals and heavy metals. Major companies such as Binani Zinc Ltd., Arjuna Natural Extracts, Merchem Ltd., Eloor, Hindustan Insecticides Ltd., Indian Rare Earth, and FACT are responsible for contaminating these areas. The lab reports indicate parameters of these companies in the sludge collected from these areas. In the circumstance LAEC recommends adequate compensation to the landowners and actions to decontaminate the land at the cost of these companies.

6. The DDT manufacturing unit of HIL comes under the purview of the Stockholm Convention of which India is a signatory. Hence the Environmental Assessment and clean up of the area should be incorporated in the National Implementation Plan. The LAEC recommends to the KSPCB to take up this matter with the concerned officers in the Ministry of Environment & Forests and request the SCMC to follow up the same.

7. PCB may notify the Govt. Laboratory at Ernakulam as State water laboratory for analyzing the statutory samples taken from the units instead of being sent to Trivandrum for analyzing as required under water Act. This will avoid delay and statutory sampling easy.

8. Pollution Control Board shall revise the accreditation now granted to the private labs. The Board should insist for NABL accreditation before granting accreditation. The accredited labs should be strictly directed to accept only those samples either taken in their presence from the authorized outlet or in the presence

of the officials of PCB and the labs should be made liable for the genuineness of the sample analyzed.

9. PCB may insist for bank guarantee from all the major companies to ensure that they adhere to the consent order. Separate bank guarantee be insisted under different Acts such as Water Act, Air Act etc. to protect air, land and water.

10. The Pollution Control Board shall insist for bank guarantee of Rs.2 to 10 lakhs from industries such as Merchem Limited, Eloor, Binani Zinc Limited, M/s. Cochin Minerals and Rutile Ltd., M/s. Sree Sakthi, M/s. Njavallil, Merchem Ltd., Edayar, HIL, TCC, FACT, Bone meal industries, Leather units and such other units, against whom LAEC has submitted reports recommending actions including closure for causing damage to environment by discharging pollutants indiscriminately in violation of environmental laws, to ensure strict compliance of the consent/authorization issued to these units and in the event of any future incident of violations detected, the bank guarantee should be forfeited followed by other actions including penal.

11. The Board should take statutory sampling in all cases where the effluent is suspected to be exceeding the consented parameters and action including forfeiture of the bank guarantee be forth be taken.

12. The Board shall appoint the present officials of the Board deputed to LAEC at Eloor office to ensure continuity of the effective monitoring of the industries of Eloor Edayar belt and to take follow up actions for implementing various recommendations of the LAEC as the committee is of the opinion that these officers are in full know how of the environmental problems caused by the industries of this belt. Such a course will be an act in the best interest of public as well as PCB. The Board will frustrate all the attempts of industrialists who have a grudge to nourish against these officials for being part of LAEC who have vowed to place them elsewhere.

13. LAEC being the beneficiary of the excellent service received from PCB staffs, namely Smt. D. Chithrakumari, Environmental Engineer, Mr. K.V. Shanavas, Assistant Scientist, K.S. Soman, Assistant Environmental Engineer and

Mr. K. Sreekandan Nair, driver, the committee recommends to these officers good service entry with increment.

14. The Board should spread out the period of validity of the Consent/ Authorization in blocks to different calendar months of a year distributing the work proportionately to ensure proper enquiry to avoid the Consent / Authorization being extended automatically by the operation of deeming provision in the statutes, owing to the failure of the Board to process all the application for renewal in bulk as has been in vogue now.

15. LAEC took samples of bottom sediments from different places of Periyar and got them analyzed. The lab reports of the samples indicate contamination of river and loss of aquatic life. The major players are Cochin Minerals and Rutails Ltd., Kainadi leathers now known as TMS leathers, Cochin leathers, Kairali leathers, Merchem Ltd.- Edayar, Merchem India Ltd – Edayar, Binani Zinc Ltd., Cochin Chemicals, Srisakthi Paper Mills, Travancore Cochin Chemicals, FACT (all divisions), Indian Rare Earth, Hindustan insecticides Ltd., and Merchem Ltd-Eloor. The other companies who have the discharge point into Periyar are also equally liable for polluting the river. Therefore all the companies having their outlets for discharge of effluent into Periyar must be held liable to bear the cost of Periyar revival project fixing the liability proportionate to their turnover.

16. The Board shall ensure water supply to the effected families in Ward Nos.1,2,3,4 and 17 of Eloor Gram Panchayath by the companies identified as the culprits for ground water contamination. This should be done on or before 31-12-2005.

17. Having regard to the nature of pollution generated by the chemical industries, the scientists who are competent to ascertain and determine the pollution in the effluent at various stages have to be necessarily involved in the field. Persons with scientific knowledge and experience can improve the monitoring system as they would be able appreciate better the functioning of the system. LAEC therefore recommend that the scientists of the Board be involved in monitoring the Companies.

18. Unauthorized tallow industries identified by LAEC have to be closed forthwith. They should be permitted to function only after obtaining consent and providing adequate pollution control measures.

19. LAEC found an internal industrial road being blocked near Cochin Fertilizers. Similar road blocking can be seen at the road leading Merchem, Edayar. By blocking the road, the regulatory agencies often face problems for inspecting industrial units and are compelled to take diversion. There is no justification in blocking public road for the exclusive use of one or two units. If any private person for the use of their unit has blocked the road illegally that unit should be directed to remove the obstruction forthwith. The roads should be opened forthwith for public use.

20. The health problems in local community can be traced to the degradation of the environment and pollution. The palliative care facilities to these victims are nil. The Board should take initiative to set up a medical care at the cost of the industries in this belt.

21. The Board shall endeavor to achieve zero discharge by the industries within a span of three years and will incorporate a condition in the Consent / Authorization issued to the units for achieving zero discharge within the said time frame as above.

22. Hon'ble High Court of Kerala have expressed strong disapproval for not maintaining sufficient staff strength to attend the statutory duties of the Board. The requirement of permanent staff needs to be attended without further delay.

23. The Board should set up four chemical check post to check regulate the illegal movement of hazardous waste / chemicals, flouting the conditions in the Authorization issued under Hazardous Waste (Management and Handling) Rules 1989.

24. Direct all the industries having pumping stations in Periyar River to install sealed water meter at the intake point. Board may collect water cess periodically based on the reading in the sealed meter. The Board should limit water intake of

the companies and consumption in excess of that limit should be assessed at higher rates.

25. The Board should file action taken report on each industry to the Supreme Court Monitoring Committee on the recommendations submitted to it by LAEC and the improvement achieved by various actions initiated by the Board.

RECOMMENDATIONS ON PERIYAR

1. Conduct a survey in the reaches of the river Periyar and demarcate its boundaries to protect it from encroachments.
2. Establish river Periyar protection force to monitor the river and take action against those indulging in activities detrimental to the river.
3. Establish Periyar river protection fund by converting the fund mobilized from auctioning sand seized from the illegal sand miners.
4. Conduct a survey of various outlets provided by the local bodies and identify the outlets open to river Periyar. Direct the local bodies to establish treatments plants for the discharge of water into river.
5. Conduct a survey on the sediment deposits and evolve such mode for removing of non-biodegradable category of pollutants, for habitat restoration and improvement of water and soil quality.
6. Establish fish sanctuaries to ensure sufficient fish and wealth in the river.
7. Establish persistent organic pollutant lab.
8. Declare moratorium for chemical industries in Eloor Edayar industrial belt.
9. Direct the industries department to use the vacant land in their possession for forestation and convert it as a lungs space.
10. No industry be allowed to set up with in the distance of 100 mts. from the river boundary in Eloor-Edayar belt.

11. Direct the companies to achieve Zero discharge within 3 years failing which refuse to renew consent for further operation.
12. In order to maintain more water flow in the river, stop construction of further dams in the upper streams of River Periyar.
13. Plant trees along the riverbanks to protect its bank.
14. River bed has become deep owing to indiscriminate sand mining. This in turn affect river bank sliding. Water table will also go down. The removal of substratum also affect benthic flora and fauna. It would also cause salinity intrusion. Therefore prohibit sand mining down stream from Malayattoor for a minimum of 10 years.”

The State Pollution Control Board considering the report of Local Area Environment Committee, though have taken some measures like opening a Surveillance Centre in the midst of industrial estate, actions on many recommendations are yet to start. Even on the matters actions have been taken, they are not pursued to find the end result. Even the Surveillance center is not made functional with sufficient infrastructure including the human resource to monitor the industries and river Periyar round the clock. Surprise inspections, lack of empowerment to take action against major culprits etc. are causing roadblocks in achieving the desired result. The Board Officers at Surveillance Center be given full authority and empowerment to satisfy itself about the adequacy of pollution control measures in the unit fastening the liability on the concerned person, in the event of system being found inadequate. The major units in the Eloor-Edayar belt are yet to comply by the various directions issued by the Board and the recommendations of the Local Area Environment Committee and the units are functioning with impunity. A strong will and determination on the part of the State Board alone can guarantee an environment fit for habitation. The units are wiling to implement pollution control measures but only if insisted on.

Having regard to the past experience and being concerned about the environmental damage already caused including to the river Periyar, the Committee recommended to constitute a Local Environmental Surveillance Committee in true spirit of the observation

made by the Hon'ble Supreme Court in paragraphs 55 and 56 of the order dated 14-10-2003. The Hon'ble Supreme Court in para 55 and 56 observed thus:

“55. The Report has emphasized that the members of alert and informed community who are fully aware of the nature of hazards and its impact on their health can help in protecting and saving the natural resources. It has referred to the law enacted in USA in the wake of Bhopal Gas Tragedy, namely, Emergency Planning and Community Right to Act, 1986, which requires preparation of emergency response plans by the companies with involvement of local community. It is also noticed that though Bhopal Gas Tragedy took place in our country, no such legislation has been enacted so far. Further HPC has given example of decision taken by Andhra Pradesh Pollution Control Board which decided that all Industrial factories shall put up two sign boards 6X4 ft. each at publically visible place at the main gate; the first providing information regarding the facility specific consent for establishment and consent for operating (CFO) conditions and the second providing information of release of pollutants” air emissions, water discharges and solid waste. It has been recommended that public participation should be secured in the management of Environment Pollution and Hazardous Waste to maximum possible extent. Suggestions given in these regards are these:

- (i) Selected local residents should be appointed as wardens for environmental surveillance, particularly to take note of illegal dumping of hazardous wastes.
- (ii) Access to public records with the environment protection authorities should be freely allowed to the public, as the right to a healthy environment has been defined as part of the Right to Life under Article 21 of the Constitution.
- (iii) Relevant important information should be displayed on notice boards and newspapers and communicated through radio, television and the Internet. The HPC would like to see all industries, involved in hazardous chemicals and generating hazardous wastes display on-line date outside the factory gate, on quantity and nature of hazardous chemicals being used in the plant, as well as water and air emissions and solid wastes generated within the factory premises. If such date is not made available, the unit should be asked to show cause or even be asked to close down.

- (iv) Informers and “whistle-blowers” within industry who provide information, should be protected and strict confidentiality about them maintained.
- (v) Third-party audit of hazardous wastes, where the audit team includes members of the community, should be made a routine practice.”

56. The suggestion is that an extensive awareness generation campaign should be taken by regulatory agencies. The HPC has prepared a list of Themes and short T.V. Programmes on hazardous wastes. All these aspects require a serious consideration by the concerned authorities.”

Bearing in mind the above observations, the Committee resolved to recommend to constitute a Local Environmental Surveillance Committee (LESC) to ensure that the industrial units in Eloor-Edayar belt continue to comply by the pollution control measures and the officers of the Board is alerted to take action as and when breach of environmental law is detected and noticed. The committee suggested the following aspects to make LESG effective:

1. LESG shall consist of at least two members from two reputed Non Governmental Organization working in Eloor-Edayar industrial belt and the Environmental Engineer or the Office-in-charge of the Pollution control office at Eloor-Edayar as Ex-Officio member.
2. The members should be provided with identity cards to enable them to inspect the industrial units in Eloor- Edayar belt, take samples, examine records, prepare mahzer , seize articles etc.
3. The members should be given an honorarium of Rs.2000/- and Rs. 500/- as traveling allowance.
4. The NGO nominating it’s representative will be at liberty to recall a member and substitute with another if there is any allegation of misconduct. The members nominated by the NGOs shall hold office for a period of 2 years unless he is removed for proved misconduct or resigned or recalled by the organization.
5. The members can seek to substitute the Environmental engineer/ Person-in-charge of PCB office at Eloor, if they are of the opinion that the said officer is not taking action against the erring unit despite proved violation of

environmental laws. The LESC shall be provided with an office attached to the office of the PCB at Eloor.

6. The Environmental Engineer, Eloor, shall forward the samples taken by the LESC for analysis to the Central Laboratory of PCB or to such other labs.
7. LESC will conduct inspection on receiving complaint from the local community or *suomoto* and a copy of the report of the inspection on request should be given to the complainant.
8. LESC should be involved in disaster management conceived for industrial area.
9. LESC will monitor the surrounding areas of Eloor-Edayar Industrial estate, the creeks of the river, river Periyar and other water resources and will endeavor to protect the environment and improve its conditions.
10. LESC shall also be authorized to inspect the vehicles carrying industrial products, raw materials and or wastes to ensure whether the transportation is genuine and the documents are proper. If any suspicion arise, the same shall be reported to the Local Police and PCB for ensuring that the transportation is genuine and is under valid documents supporting the movement.”

The Committee also suggested the names of the following persons from the local area to act as an alert and informed community being aware of the nature of hazardous and its impact on their health.

1. Mrs. Agnes Raju, (A Bachelor of Fisheries Science and resident of Ward No.17. She is also a social activist.),
2. Miss. M.K. Asha,(A former Eloor Grama Panchayath Member)
3. Safar P.A., (A member of Solidarity Youth Movement, a social organization and a committed environmentalist)
4. M.K. Kunjappan, (A retired P&T employee. He is a trade union leader and social and environmental activist)
5. M.M. Sakkeer Hussain, (The General Convener of Periyar Malineekarana Virudha Samithi).

By constituting a body like this, the Officers of the State Board become more responsible and accountable.

Local Area Environment Committee presents this limited study of environmental impact assessment of Eloor – Edayar industrial belt with a request to all concerned to open their eyes and act earnestly to protect the mother earth from the hands of environmental rapist.

While submitting this report, I have three major concerns which the affected community have been asking.1) The drinking water problem of the local community who lost their natural source by contamination, 2) the recurring incidents of illegal discharge directly into to river Periyar or through its creek, and (3) the fate of the two paddy fields (namely Edayattuchal and Chakkarachal) that lost its utility by industrial waste. People in Eloor-Edayar are mostly from the lower strata of the society and are suffering without finding any change to their quality of life even after the interference of Supreme Court Monitoring Committee. Their despair is visible on their face. Their anxiety as to what next, is difficult to answer. We leave the question for being answered by the authorities concerned who are expected to act on this report. The answer to the question lies in the fate of this report.

Adv.P.K Ibrahim
Chairman, LAEC

ENVIRONMENT IMPACT ASSESSMENT ON ELOOR-EDAYAR INDUSTRIAL BELT 2005-2006

Local Area Environment committee under the term of reference was asked to conduct an environmental audit of 247 industries located in Eloor-Edayar industrial belt and report the effect on the ecology, environment and on the health of the local population with the specific reference to the study of raw materials, products, production process, waste generation, compliance with environment laws, unauthorized disposal of waste. The committee conducted the auditing of the industrial units one by one and a consolidated report was submitted to the Supreme Court Monitoring Committee covering the raw materials, products, production process, waste generation, compliance with environment laws and unauthorized disposal of waste with recommendations of remedial measures to be undertaken by the regulatory agency to prevent further deterioration of the environment. The committee after submitting its audit report on the industrial unit, undertook the study of evaluating the present general overall environmental status of Eloor-Edayar. The study essentially involve an exercise of expertise into various metals, pesticides and other pollutants with due regard to the various pollutants identified during the auditing of industrial units which includes small, medium and major industrial establishments producing a wide range of chemicals, fertilizers, pesticides, minerals and radio active materials. However having regard to the limitation of the committee and the time constrains, the committee decided prudently to confine its study on selected heavy metals and iron which have been found in an alarming proportion in the area rendering the environment a toxic hot spot. The study also extended to the organo-chlorinated pesticides to assess the environmental impact from the pesticide manufacturing industries. The limited study thus made on heavy metals itself give an alarming deplorable result that require strong remedial measures to arrest further deterioration.

Before examining the impact of heavy metals on the environment, it is profitable to understand what exactly these metals are and the impact of its presence in the environment.

TOXICOLOGICAL STUDY OF HEAVY METALS & PESTICIDES

Zinc

Zinc is relatively a common metal, identified as 23rd in the order of chemical abundance. It is found in earth's crust at an average concentration of 80mg/kg. It is often associated with the ores of other metals like copper, lead and cadmium (Kroschwitz & Howe-Grant 1995).

Zinc occurs in the environment, primarily in the +2 oxidation state (stable state), either as the free zinc ion, or as dissolved and insoluble complexes and compounds. In soil, it often remains strongly sorbed and in the aquatic environment it will predominantly bind to suspended materials before finally accumulating in the sediments. Zinc in a soluble form (eg: sulphate or chloride) is far more likely to migrate through the environment than if it is bound in organic matter or present as insoluble precipitate.

According to the United States Public Health Standards 1997 (USPHS 1997), permissible levels of zinc in the drinking water is 0.02 — 1.2mg/l (as per Indian Standard 5 mg/l (IS 10500 — 1983), in river water sediment permissible limit is less than 100mg/kg and in soil permissible limit is 10—300mg/kg (50mg/kg average).

Toxicity

Zinc, nutritionally is an essential metal, having enzymatic and regulatory roles in biological systems. Deficiency in human can result in severe health consequences including growth retardation, anorexia, dermatitis, depression and neuropsychiatric symptoms. At the other extreme, **excessive exposure, in both humans & animals, can cause gastro intestinal distress, diarrhoea, pancreatic damage and anemia. (Goyer 1997).**

Nickel

Nickel is the 24th abundant element in the earth's crust with an average concentration of 75mg/kg. Its important ores are laterites (oxides of silica) and Pentlandite (sulphides of silica). Pentlandites are often associated with metals like Copper and Cobalt. The behavior of Nickel in the aquatic environment cause to form complexes with a variety of soluble organic and inorganic materials. It has direct adsorption on to particles such as clays and has ability to co-precipitate with hydroxides of Iron and Manganese. It is soluble

at higher pH values and get precipitated at pH 10. It is bio accumulated on some aquatic organisms like phytoplanktons, seaweeds and algae. **In soil, average residence time of Nickel is estimated to be 2400 to 3500 years. It is extremely persistent on soil, it is reasonably mobile and has potential to leach through soil and subsequently enter ground water (USPHS.-1997)**

Toxicity

Very precise function of Nickel is unclear in human but is essential for normal growth and reproduction of some species of animals, plants and microorganisms. However in the other extreme, there is sufficient evidence on the carcinogenicity of Nickel and Nickel compounds like oxide, sulphide, carbonate and hydroxide. On Toxicity studies carried out in prawns (*Penaeus Monodon*) proves that -increased concentration of Nickel affect its survival and growth. As per the European Economic Council directive (80/778 EEC), maximum permissible limit of Nickel is 50µg/l in potable water. In soil, according to the UK department of Environment (ICRCL), permissible level of Nickel is 0-20mg/kg and the permissible level of Nickel in river sediment is average 50mg/kg (USPHS 1997). Excessive concentration of Nickel in river water is dangerous to aquatic life.

Cadmium

Cadmium is a relatively rare metal, being 67th in order of chemical abundance. It is found in the earth's crust at an average concentration of 0.1mg/Kg. It is found associated with sulphide ores of Zinc, Copper & lead and is obtained as a by product during the processing of these ores.

Cadmium is a by-product of Zinc and Lead mining & smelting. It is currently used for the production of Nickel-cadmium batteries. Cadmium is more mobile in the aquatic environments than most other metals. It is also bio-accumulative and persistent in the environment. It is found in the surface and ground water as either the +2-hydrated ion or as an ionic complex with other organic or inorganic substances. While the soluble forms migrate in water, Cadmium in insoluble complexes or adsorbed to sediments is relatively immobile.

According to USPHS 1997 & WHO 1992 standards, permissible levels of cadmium in the fresh water and drinking water is less than one micro grams / litre and the same in the river sediment and soil is 1.0 mg/kg and 0.01-2.0 mg/kg respectively.

Toxicity

Cadmium has no bio-chemical or nutritional function and it is highly toxic to both plants and animals. In humans and animals, cadmium toxicity causes kidney damages. In aquatic organisms, phyto planktons, copepods and isopods are sensitive to concentrations as low as one micro gram/l.

Chromium

Chromium is the 21st most abundant element in the Earth's crust with an average concentration of 100mg/kg. The only ore of Chromium of commercial importance is Chromite (FeCr_2O_4). According to the United State Public Health Standards (USPHS) permissible levels of Chromium in drinking water is 0.4-0.8micro grams/l, in fresh water sediment 500mg/kg and in soil 100mg/kg. Many different oxidation states of chromium exist in the environment, but the Trivalent (III) and hexavalent (VI) forms are considered to be of biological importance. In aquatic environment Chromium (VI) will be present in soluble form which will eventually be converted to chromium (III), by reduction with Hydrogen sulphide, sulphur, Iron sulphide, ammonium and Nitrate. Chromium (III) & (VI) have been shown to accumulate in many aquatic species, especially in bottom feeding fishes. In soil, Chromium (III) is relatively immobile due to its strong adsorption capacity but Chromium (VI) is highly unstable and mobile. If chromium (III) is discharged in to the environment, there is no guarantee that it will remain in the in active state. For example, the land filling of tannery waste with other industrial wastes, or domestic wastes, which on decomposition can yield acidic conditions, can result in the oxidation of Chromium (III) to Chromium (VI).

Toxicity

Chromium (III) is considered an essential trace nutrient, required for glucose, protein & fat metabolism in mammals but chromium (VI) is non-essential, toxic and known carcinogens. Damage to kidney and liver is also reported.

Copper

Abundance of copper in the earth's crust is ranging from 24-55mg/kg. Copper is found more commonly as Sulphide (copper pyrite), Oxide (cuprite) or carbonate (malachite). Copper is highly ductile metal and an excellent conductor of heat and electricity. It is commercially used for manufacturing alloys (eg. brass & bronze), anti corrosive plating, as a catalyst, fungicides and algaecides. According to United Nations Environment Programme studies (UNEP 1993), maximum permissible level of copper in fresh water is <20 micro grams/l, in soil 22-30mg/kg and in river sediments 45-50mg/kg. Copper exists in natural waters either in the dissolved form as cupric+2 or complex with inorganic anions or organic ligands like carbonates, chlorides or as insoluble precipitate like hydroxides, phosphates or sulphides or adsorbed to particulate matter. In soil copper has high affinity for sorption by organic and inorganic ligands (hydroxides of iron, aluminum and manganese). Copper in the soluble form more likely to migrate through the environment.

Toxicity

Aquatic toxicity of Copper is well studied. **It is reported that fish exposed to levels of 25 micro grams /l (UNEP1993) there is reduction in the survival, growth and fertility of amphipods and embryonic sensitivity.** Most sensitive organisms were found missing from the sites where sediment coppers levels exceeds 200mg/kg. **Drinking water standard stipulated by Bureau of Indian Standards (1995) is 0.05 milli grams/l. Regarding the soil contamination a level up to 100mg/kg is considered safe but anything above this level is classified as contaminated.**

Lead

Lead is dense, relatively soft, malleable metal. All Lead compounds are poisonous. The element has four naturally occurring stable isotopes, three of which results from the decay of naturally occurring radioactive elements. There are 25 known radioactive isotopes of Lead.

Toxicity

Lead is a highly toxic substance, exposure to which can produce a wide range of adverse health effects. Reported studies shows that the reduced IQ, attention deficit disorders, impaired hearing, kidney damage, increase in BP, fertility problems, nerve disorders etc are the effects of Lead poisoning. Recent research published in the New England journal of medicine provides new evidence that there could be very harmful effects in blood occurring at even lower levels of exposure, even as low as 5 micrograms. Recent studies suggest that there is in fact no level of lead exposure that can be considered safe.

Iron

Iron is a lustrous, ductile, malleable metal. It is chemically active and forms two major series of chemical compounds called ferrous and ferric compounds. Iron rusts readily in moist air, forming a complex mixture of compounds that is mostly ferrous-ferric oxide. Iron is the fourth most abundant element in the earth's crust. It is found distributed in the soil in low concentrations and found dissolved in ground water and the ocean to a limited extent.

Toxicity

The toxic effects due to the exposure to iron leads to abdominal discomfort, lethargy and fatigue. Liver is the major site of iron storage. Excess iron deposition will lead to shrinkage of liver followed by fibrosis and cirrhosis (conte et al, 1986). Congestive cardiomyopathy is the most common defect that occurs with Iron overload.

DDT(Dichloro Diphenyl Trichloroethyne)

DDT is a chlorinated hydrocarbon compound soluble in Benzene, Chloroform, and Ethanol petroleum solvent. The material is insoluble in water and slightly corrosive to iron and aluminium. Exposure to heat will cause emission of toxic fumes. It affects the ecosystem by way of reduction of photosynthetic oxygen liberation in various green algae. There are reports of high degree of accumulation in aquatic molluscs, algae, bacteria, crab, fishes, mosquito larvae etc and also in the body fat of animals. The disappearance from the contaminated soil will take 4-30 years.

Toxicity.

According to hazardous rating, the material comes under extremely hazardous category. By inhalation /ingestion /contact, will lead to symptoms like headache, fatigue, rapid respiration, low pulse, diarrhea, vomiting, irritation of eyes and skin, blurred vision etc.

BHC (Benzene Hexachloride)

An organochlorine compound is sensitive to alkalies and corrosive to metals. Once introduced to the environment it strongly absorb to soil materials and almost desorption takes place. It is bioaccumulative and biomagnifies. It can be measured in ambient air, drinking water, soil, food and breast milk. Reported studies reveal bioaccumulation of BHC in Algae, Polychaetes, crustaceans and pisces. When heated to decomposition it emits toxic fumes of chlorine, HCl and Phosgene. **BHC is toxic to aquatic life, plants, animals and human beings. It is a possible carcinogen to human and also appears to be a tumor promoter.**

Toxicity

According to hazard rating the material comes under highly hazardous category. By inhalation /ingestion/contact, symptoms like headache, dizziness, vomiting, weakness in legs and convulsions, irritation of eyes and skin, muscular weakness etc, are seen. It also causes Aplastic anaemia.

Endosulphan

This is an organo chlorine compound insoluble in water and soluble in chloroform, Kerosene and most organic solvents. Endosulphan is a cyclodiene insecticide.

Toxicity

Endosulphan may be lethal to human and animals by inhalation or dermal exposure. The main target is the central nervous system, liver, kidney, gastrointestinal, haemotopoiatic and dermal systems.

MAP OF ELOOR - EDAYAR INDUSTRIAL BELT



* LOCATIONS OF SOIL SAMPLING

METHOD OF SAMPLING

Water samples for heavy metal and pesticide analyzed were collected in pre – cleaned and dried glass bottles, rinsed thoroughly with nitric acid in order to remove any heavy metal or organic residues. Soil samples were collected using the equipments like thief, grab sampler, scoops and shovels in clean polythene covers. All soil samples were collected at a depth of 20-40cm. Samples after collection were preserved, sealed and sent to central laboratory of Kerala State Pollution Control Board, Ernakulam. Metal analysis was done using Atomic Absorption Spectro photometer (A.A.S). Pesticides were analyzed using Gas chromatograph (GC)

Soil /sludge samples and water samples for the Eloor and Edayar area were collected from the premises of industrial units and area surrounding the industry up to a distance of approximately 1.5km radius. Samples were collected from Chakkarachal paddy field, Edayattuchal, the southern side of Edayar area, Kuzhikkandam thodu and surrounding area, Ammanthruthu paddy field, Panachithodu and Unthithodu area. Results of the analysis were done at the Central laboratory of the Kerala State Pollution Control Board, Kochi. Analytical methods were based on the standard of American Public Health Association (APHA).



Soil Sampling using thief



1. Analytical results of well water samples from Eloor area

The maximum and minimum concentration of pollutants present in the well water samples collected from Eloor area are given in Table No: 1. The results show that the maximum concentration of Iron, Zinc and Lead are 2.94mg/l, 6.0mg/l and 0.44mg/l respectively against the limits 0.3mg/l, 5mg/l and 0.1mg/l (IS:10500 1983). Other parameters like Copper, Cadmium, Nickel is below detectable level.

Table No:1

Sl: No.	Determinant	Unit	Concentration (range)	Limit(As per IS:10500-1983)
1	pH		5.7-8.3	6.5-8.5
2	Zinc	mg/kg	BDL-6.0	5.0
3	Iron	mg/kg	0.02-2.94	0.3
4	Lead	mg/kg	BDL-0.44	0.1

2. Analytical Result of Soil samples collected from Eloor Area

Soil samples were collected from Industrial premises, Ammanthuruthu paddy field, and Surrounding area of Kuzhi kadam thodu including the residential places. The maximum and minimum concentration of pollutants present in the soil samples collected are given in Table No: 2.

Table No: 2

Sl:No:	Determinant	Concentration (Range) in mg/kg	Limits(mg/kg)*
1	Zinc	42.0 - 3271.0	300
2	Iron	6385.0 - 80075.0	---
3	Lead	48.0 - 578.0	---
4	Cadmium	3.0 - 21.0	2.0
5	Copper	8.0 - 1012.0	30.00
6	Nickel	21.0 - 111.0	500
7	Chromium (VI)	2.0 - 18.0	--
8	Total chromium	56.0 - 421.0	100.00

*Limits according to the norms under the United States Public Health Standards (USPHS1997).



Moving along the Kuzhikandomthodu for sampling



Amanthuruthu Paddy Field of Eloor

3. Analytical results of sediment samples from Eloor Area

Sediment samples were collected from the different stretches of Kuzhikandam thodu, Panachithodu , Unthi thodu and surrounding low lying land.

The minimum and maximum concentration of pollutants present in the sediment samples collected are given in Table No: 3.

Table No:3.

Sl:No:	Determinant	Concentration obtained (Range) in mg/kg	Limits(mg/kg)*
1	Zinc	116.0 - 1449.0	300
2	Iron	18900.0 - 50260.0	--
3	Lead	180.0 - 598.0	--
4	Cadmium	6.0 - 19.0	2.0
5	Copper	56.0 - 186.0	30.00
6	Nickel	31.0 - 56.0	500
7	Chromium (VI)	9.0 - 79.0	--
8	Total chromium	206.0 - 406.0	100.00
9	DDT	315.0(max:)	--
10	BHC	20.0(max:)	--
11	Endosulphan	60.0(max:)	--
12	Organic Halogen	250.0(max:)	--

*Limits according to the norms under the United States Public Health Standards (USPHS1997).

4. Analytical results of well water samples from Edayar area

The minimum and maximum concentration of pollutants present in the well water samples collected from Edayar area are given in Table No. 4. The results show that the maximum concentration of Zinc and Iron are 7.5 mg/l and 2.2mg/l respectively against the limits 5mg/l and 0.3mg/l (IS: 10500 1983). Other parameters like Lead, Copper, Cadmium, Nickel are below detectable level.

Table No: 4

Sl: No.	Determinant	Unit	Concentration (range)	Limit(As per IS:10500-1983)
1	pH		5.4 - 8.2	6.5-8.5
2	Zinc	mg/kg	BDL - 7.5	5.0
3	Iron	mg/kg	0.03 - 2.2	0.3
4	Fluorides	mg/kg	BDL - 0.3	1.2



**RESIDENTIAL AREA FLOODED WITH TOXIC WATER
NEAR THE BANK OF KUZHIKANDAM THODU**



Amanthuruth Pady Field

5. Analytical results of soil samples from the surrounding area of Edayattuchal.

The minimum and maximum concentration of pollutants present in the soil samples collected from the surrounding area of Edayattuchal is given in Table No:5

Table No:5

Sl:No:	Determinant	Concentration (Range) in mg/kg	Limits as per USPHS(mg/kg)*
1	Zinc	72.0 - 1577.0	300
2	Iron	8600.0 - 93925.0	----
3	Lead	94.0 - 424.0	----
4	Cadmium	2.4 - 66.0	2.0
5	Copper	20.4 - 148.0	30.00
6	Nickel	28.0 - 64.0	500
7	Chromium (VI)	2.2 - 19.2	
8	Total chromium	28.0 - 350.0	100.00

*Limits according to the norms under the United States Public Health Standards (USPHS1997)

6. Analytical results of soil samples from the surrounding area of Chakkarachal.

The minimum and maximum concentration of pollutants present in the soil samples collected from the surrounding area of Chakkarachal is given in Table No:6

Table No:6

Sl:No:	Determinant	Concentration (Range) in mg/kg	Limits as per USPHS(mg/kg)*
1	Zinc	280.0 - 19810.0	300
2	Iron	11775.0 - 139640.0	----
3	Lead	90.0 - 218.0	----
4	Cadmium	3.0 - 175.0	2.0
5	Copper	25.0 - 160.0	30.00
6	Nickel	32.0 - 53.0	500
7	Chromium (VI)	2.8 - 7.0	
8	Total chromium	29.4 - 85.8	100.00

*Limits according to the norms under the United States Public Health Standards (USPHS1997).

7. Analysis Report of Soil Sample and Paddy Plant taken from Chakkarachal Paddy Field – Edayar.

Sl. No.	Determinant	Unit	Concentration		Limits as per (USPHS)*
			Soil – Paddy Field – Chakkarachal	Paddy Plant - Chakkarachal	
1	Zinc	mg/kg	19810	1596	300
2	Iron	”	139640	16160	--
3	Lead	”	224	142	35 @
4	Cadmium	”	113.6	3.0	2
5	Copper	”	24.4	7.0	30
6	Nickel	”	47.00	22.2	500
7	Chlorides	”	230	420	--
8	Cyanides	”	BDL	BDL	--
9	Magnesium	”	388	291.6	--
10	Hexavalent Chromium	”	3.0	2.1	--
11	Total Chromium	”	55.8	46.8	100
12	Vanadium	”	BDL	BDL	--
13	Titanium	”	BDL	BDL	--

*Limits according to the norms under the United States Public Health Standards (USPHS1997)

@ Canadian Sediment Quality Guidelines

Even though the crops raised in the paddy field shows very disturbing results. Presence of metals in the soil as well as in the paddy plants depicts a very sad state environmental and soil quality. Too extensive paddy field, which raised substantial paddy, has now been rendered completely and absolutely useless. A recent photograph taken from Chakkarachal paddy field speaks itself its present status indicating the findings of the Committee. It is a standing testimony speaks the harrowing picture of the farmers.



Edayattuchal - A sampling spot at Edayar



Chakkarachal Paddy Field a seen of agricultural operation - futile effort

8. Analytical results of soil samples from Southern side of Edayar area

The minimum and maximum concentration of pollutants present in the soil samples collected from the Southern side of Edayar area are given in Table No:8.

Table No:8

Sl:No:	Determinant	Concentration (Range) in mg/kg	Limits as per USPHS (mg/kg)*
1	Zinc	72.0 - 1577.0	300
2	Iron	8600.0 - 93925.0	----
3	Lead	90.0 - 424.0	----
4	Cadmium	3.0 - 66.0	2.0
5	Copper	20.0 - 804.0	30.00
6	Nickel	32.0 - 262.0	500
7	Chromium (VI)	2.0 - 36.0	
8	Total chromium	29.0 - 1100.0	100.00

*Limits according to the norms under the United States Public Health Standards (USPHS1997)

9. Analytical results of sediment samples from Edayattuchal in Edayar area

The minimum and maximum concentration of pollutants present in the sediment samples collected from Edayattuchal in Edayar area are given below (Table No: 9).

Table No:9

Sl: NO.	Determinant	Concentration (Range) in mg/kg.	Limits as per USPHS (mg/kg)*
1	Zinc	151880.0 - 188060.0	300.0
2	Iron	9320.0 - 30440.0	
3	Lead	46.0 - 324.0	
4	Cadmium	286.0 - 568.0	2.0
5	Copper	23.0 - 77.0	30.0
6	Nickel	18.0 - 26.0	500.0
7	Total Chromium	13.0 - 54.0	100.0

*Limits according to the norms under the United States Public Health Standards (USPHS1997)

10. Analytical results of sediment samples from Chakarachal in Edayar area

The minimum and maximum concentration of pollutants present in the sediment samples collected from Chakarachal in Edayar area are given below (Table No. 10).

Table No.10

<u>Sl.No:</u>	<u>Determinant</u>	<u>Concentration (Range) in mg/kg</u>	<u>Limits as per USPHS(mg/kg)*</u>
1	Zinc	3362.0 -- 33050.0	300
2	Iron	19300.0 -- 21620.0	-----
3	Lead	58.0-- 134.0	-----
4	Cadmium	79.0 -- 140.0	2.0
5	Copper	24.0 -- 25.0	30.0
6	Nickel	15.0 -- 24.0	500.0
7	Total Chromium	60.00 -- 95.0	100.0

*Limits according to the norms under the United States Public Health Standards (USPHS1997).

11. Analytical results of river water samples.

Samples were collected from different stations from Pathalam to Chittoor Ferry. The minimum and maximum concentration of pollutants present in the river water samples collected during the river survey conducted on 4/12 /2004 and 2/4/2005 are given in Table No : 11.

Table No: 11

Parameter	Stations where min: and max: conc: obtained. (Unit mg/l)	Concentration (range)	Lmits in mg/l (IS:10500-1983)
PH	Chittoor ferry Chiran thuruth	4.1 7.5	6.5 - 8.5
Zinc	Near Njavally Near CMRL outlet	0.22 2.0	15.0
Iron	Near CMRL outlet Pathalam bridge	0.6 224.0	0.3
Cadmium	Near Sud chemie	0.07	0.01
Copper	Near Abco Near Njavally	0.03 0.08	1.5
Nickel	Near FACT Outlet Near Sud chemie	0.04 0.39	---

12. Analytical results of river sediment samples.

The minimum and maximum concentration of pollutants present in the river sediment samples collected during the river survey conducted on 4/12 /2004 and 2/4/2005 are given in Table No: 12

Table No:12

Sl:No:	Determinant	Concentration, (Range) in mg/kg	Limits (mg/kg)*
1	Zinc	89.0 - 13270	<100
2	Iron	1993.0 - 223750	---
3	Lead	24.0 - 323.0	35.0 **
4	Cadmium	1.0 - 98.0	2.0
5	Copper	3.0 - 343.0	50.0
6	Nickel	11.0 - 126.0	65.0
7	Total chromium	21.0 - 1054.0	500.0

*Limits according to the norms under the United States Public Health Standards (USPHS1997).

** Canadian Environmental Quality Guidelines (1999).

MAIN INDUSTRIES GENERATING HEAVY METALS AND PESTICIDES

1 HINDUSTHAN INSECTICIDES LIMITED, ELOOR.

Name of the Product/s	:	DDT(Tech)	- 3.73 MT/day
		DDT 50% WDP	- 7.47 MT/day
		Endosulfan (Tech)	- 4.43 MT/day
		Hildan 35 EC	- 5.33 KL/day
		Dicofol (Tech)	- 0.417 MT/day
		Hilfol 18.5 EC	- 2 KL/day
		Mancozeb 75 WP	- 3.15 MT/day
		Recovered Sulphuric Acid	- 5 MT/day
		Recovered Hydrochloric Acid	- 4.42 MT/day

Raw materials	:	<u>Name</u>	<u>Consumption in MT/day</u>
		MCB	4.1
		Chloral	1.85
		Alcohol	1.4
		Oleum	7
		Chlorine	4.7
		CTC	0.75
		Na OH Flakes	0.075
		HCCP	3.5
		BD	1.15
		Toluene	0.45
		Thionyl Chloride	1.55
		EPH	0.07
		Ivamol	0.07
		Tech.DDT	3.8
		China Clay	2.7
		Hydrated Calcium Silicate	0.38
		Soda Ash	0.2
		Surfactants	0.63
		Tech.Endosulfan	2
		Emulsifier	0.28
		Stabilizer	0.075
		Solvent	3.5
		Carbon di Sulfide	1.9
		Ethylene Diamine	0.7
		Caustic Soda lye	0.92
		Manganese sulphate	1.9
		Zinc Sulphate	0.35
		Hexamine	0.065
		Furnace oil	4.0
		HDO	0.2

Production Process:**1. DDT**

DDT is an insecticide used to control agricultural pests and Malaria Vectors such as mosquitoes. Alcohol is chlorinated to produce Chloral alcoholate, which is then distilled in the presence of oleum to produce Chloral. Chloral and monochlorobenzene are condensed in the presence of oleum to produce DDT. The Technical grade DDT is further processed into water dispersible powder by particle size reduction after mixing with materials like china clay and wetting and dispersing agents.

2. Endosulfan

The company is not producing Endosulfan at present after the fire accident occurred in July 6th 2004. Endosulfan is an insecticide/acaricide used against all kinds of pests. Production started in 1980's.

Manufacturing process consists of two stages. In the first step an intermediate product Het diol is produced by the condensation of Hexachlorocyclopentadiene (HCCP) with Butenediol in the presence of solvent toluene and an acid scavenger Epichlorohydrin. The slurry is centrifuged to separate Het diol powder. Excess Hexachlorocyclopentadiene and toluene are recovered by distillation and reused.

In the second step Het diol is condensed with thionyl chloride in the presence of solvent toluene to get endosulfan. The Hydrochloric acid formed during the reaction is absorbed in water to get 30% Hydrochloric acid as a byproduct. The brand name of Endosulfan EC produced in HIL is Hildan.

3. Dicofol

Dicofol is an insecticide used in controlling mites and lice and is widely used as an acaricide in tea plantation and vegetable garden. Production started in 1996. Dichloro Diphenyl Dichloro Ethylene (DDE) is produced by hydro chlorination of DDT.

DDT is converted into DDE with the elimination of one molecule of HCl by Sodium hydroxide in Ethanol medium at 90⁰ C. In the second step DDE is chlorinated to produce Tetrachloro compound (Tetramer). The tetramer is hydrolysed using sulphuric acid at 130⁰ C to produce Dicofol. Technical product is formulated as 18.5%EC for use in agriculture.

4. Mancozeb

Mancozeb is a fungicide introduced in the production list of HIL recently. This has an inorganic base of $MgSO_4$ and $ZnSO_4$ complex. Mancozeb is manufactured from Carbon disulfide, ethylene diamine, manganese and zinc salts.

Manufacturing process consists of the following steps.

1. Naham is produced by reacting ethylene diamine and Carbon disulphide with sodiumhydroxide.
2. Naham is reacted with manganese sulphate to produce Maneb.
3. Maneb slurry is reacted with zinc sulphate to form mancozeb.
4. Mancozeb slurry is dried in a spray drier to get Technical grade mancozeb.

1800 tpa mancozeb formulation is also made . Different liquid formulations are made by dissolving the technical grade product in suitable solvent and adding emulsifier and stabilizer. Active ingredient content is made to adjust the requirement.

Waste:

Sources of hazardous waste are ETP sludge, pesticide residue from settling tanks, floor sweepings, HCCP residue and spent /used oil.

The analytical data of sludge is given in Table No: 13

Table No:13

Sl.No	Determinant	Unit	Sludge from Lagoon
1	Zinc	mg/kg	4560
2	Iron		30720
3	Lead		1500
4	Cadmium		8.0
5	Copper		65.4
6	Nickel		160.2
7	Arsenic		BDL
8	Magnesium		13000

The analytical data of solid waste from effluent settling tank is given in Table No:14

Table No:14

Sl. No	Determinant	Unit	Settling tank meant for Dicofol and Mancozeb effluent.
1	p ^H		3.4
2	SS	mg/l	136
3	TDS	„	5540
4	Chlorides	„	3300
5	Sulphate	„	1250
6	Phenolic Compounds	„	0.04
7	Oil & grease	„	ND
8	DDT	microgram/l	8.319
9	BHC	„	1017.68
10	Endo Sulphan	„	ND

Sediment samples collected and analyzed from the down stream of HIL outlet contained compounds of DDT and its metabolites, BHC and Endosulfan and other organic halogens.

DDT and its metabolites were present and are detectable in those samples analyzed in the wetlands surrounding the Kuzhikandam thodu , Ammanthuruth paddy fields and Unthithodu area. There are wide spread protests from the local people living around Kuzhikandam thodu regarding the odour of pesticides and deposits of pesticide residues especially during monsoon. During rainy days the level of water rises in thodu and the surrounding land is flooded with contaminated water. When the flood water is drained the entire hazardous materials carried by it get deposited in the residential area. The analysis report of the soil sample collected from the low lying residential plot close to the thodu shows high concentration of heavy metals and halogenated compounds. The determination of the compounds and their effects on the surrounding environment demands more investigation. The study clearly indicates that the complaints raised by the public are found to be genuine.

2 MERCHEM LIMITED, ELOOR.

Products:

Name	Quantity
1. Accelerators	: 3.8 TPD
2. Antioxidant	: 2.0 TPD
3. Sodium Sulphide	: 0.67 TPD

Raw materials :

<u>Name</u>	<u>Quantity</u>
1. Aniline	: 385 MT/Yr
2. Acetone	: 176 „
3. Carbon disulphide	:275 „
4. Industrial Methylated Spirit	:83 KL
5. Caustic Soda Lye	: 385 MT/Yr
6. Sulphuric Acid	: 110 „
7. Hydrochloric Acid	: 20 „
8. Toluene	: 22 „
9. Soda Ash	: 10 „
10. Trichloroethylene	: 25 „
11. Chlorine	: 66 „
12. Hydrogen peroxide	: 40 „
13. Hexachlorobenzene	: 45 „
14. Sodium Sulphide	: 35 „
15. Sulphur	: 110 „
16. Elasto 245 oil	: 2 „
17. Sodium Sulphite	: 6 „
18. Ferric Chloride	: 4 „

Merchem Limited Eloor is an industry dealing with hazardous chemicals and generating hazardous waste. The main products are MBT, MBTS, NAMBT, CBS, MBS, DCBS, TQ etc.

The analytical data of sludge from the storage tank is given in Table No:15

Table No:15

Sl. No	Determinant	Unit	Sludge from hazardous waste storage tank
1	Zinc	mg/kg	578.5
2	Iron		57750
3	Lead		128
4	Cadmium		8.2
5	Copper		99.1
6	Nickel		46.6
7	Arsenic		ND
8	Total Chromium		173.3
9	Manganese		457

The location of the industry is surrounded by low-lying wet marshy lands through which the Kuzhikandam thodu is flowing. On investigation the quantity of sludge accumulation in the thodu was found to be up to a depth of three feet.. As the thodu in the location of reference is near to its origin there will be only very little flow especially during dry season. During the period, if any industry discharges untreated effluent to the thodu the quality of water flowing will be similar to that of the effluent as the possibilities of the dilution is nil. Since the flow path of the thodu is through an area where many residential houses are existing, the impact on the thodu due to industrial discharge in fact directly affected the local population. During rainy days the level of water rises in thodu and the surrounding land is flooded with contaminated water. When the flood water is drained the entire waste materials carried by it get deposited in the residential area. The analysis report of the soil sample collected from the low lying residential plot close to the thodu shows high concentration of heavy metals and halogenated compounds. The determination of these compounds and their effects on the surrounding environment demands more investigation. There are recurrent complaints from the local people and the study clearly indicates that the complaints raised by the public is found to be genuine.

The unit was established in 1997. Right from the day of its trial, there had been complaints from the public. The committee recommended closure of this unit after detecting the deceptive system of effluent discharge mechanism. The complaints still persist though the unit has been compelled to install modern treatment system. In the

circumstance Supreme Court Monitoring Committee issued directions to the Board to direct the company for installing appropriate meters to ensure the operation of treatment plant. The Board is yet to implement this direction.

3. INDIAN RARE EARTHS LIMITED

Raw materials :	Monozite	: 7.94t/day
	Caustic soda	: 4077t/day
	Hydrochloric acid	: 4t/day
	Oxalic acid	: 0.6t/day
	Sulphuric acid	: 0.13t/day
	Soda ash	: 0.25t/day
	Sodium hypochlorite	: 3.55t/day
	Hydro Fluoric acid	: 140l/day
	Process water	: 83kl/day
	Magnesium sulphate	: 10kg/day
	Barium carbonate	: 19kg/day
	Sodium sulphide	: 65kg/day
	Furnace oil	: 7.0t/day
	Diesel	: 135l/day
	Kerosene	: 16l/day

Products :	Rare Earths Chloride(Composite)	: 11t/day
	Tri Sodium Phosphate	: 13t/day
	Rare Earths Fluoride	: 0.3t/day
	Cerium oxides	: 1.0t/day
	Thorium Oxalate	: 2.0t/day
	Evaporated Lye	: 1.5t/day

Production Process

The industry is engaged in the processing of Monozite sand, which is a phosphate mineral of Rare Earths and Thorium. This sand constitutes about 4 to 5% of the beach sands of Kerala and Tamil Nadu at certain locations towards the tip of peninsula, the other constituents being Ilmenite, Zircon, Sillimanite, Garnite, Rutile etc.

Monozite contains about 60% of Rare Earths expressed as M_2O_3 , 8-9% Thorium expressed as ThO_2 , and 27-29% Phosphate expressed as P_2O_5 . Raw monozite sand after being ground to a very fine size is mixed with Caustic Soda in the form of Lye, and digested at about 140 to 160⁰ C for a few hours when insoluble hydroxides of Rare Earths and Thorium and soluble Sodium Phosphate are formed.

The top solution is decanted, clarified by filtration and cooled by adiabatic vaporation in a vacuum crystallizer. This crystallized slurry is centrifuged and the crystals are dried in a hot air pneumatic conveyor drier and the dry Tri sodium Phosphate having a P_2O_5 content of 17.5% is packed in bags.

The mother liquor from centrifuge is a weak Caustic Soda solution of about 10% concentration. This is concentrated by evaporation and re-used for reaction with monozite.

The slurry of insoluble hydroxides is filtered and washed in rotary drum vacuum filter to free it of soluble Phosphate and Lye. The washed hydroxides are then treated with commercial Hydrochloric Acid under controlled conditions to dissolve the Rare Earths preferentially leaving thorium hydroxide undissolved. The slurry is allowed to settle and clear RE Chloride solution is decanted.

The Crude thorium hydroxide slurry is dissolved in HCL and subjected to a solvent extraction process to separate and recover Uranium and produce high purity Thorium Oxalate.

Waste

The company is generating hazardous waste as detailed below.

1. 745 kg/day Insoluble waste separated as undigested sand from raw material is stored and disposed in RCC trenches /silos.
2. 465kg/day Sludge separated while deactivation of rare earth chloride is Stored and disposed in underground FRP lined RCC trenches.
3. 460kg/day dried sludge generated from the effluent treatment plant is disposed in trenches in open land at the disposal site .

On analysis of the sludge generated from the ETP it is noticed that Zinc, Lead, Iron, Cadmium, Copper, Nickel, Chromium etc are present.

Analytical data of the solid waste is given in Table No:21

Table No:21

SL No:	Determinant	Unit in mg/kg	Concentration
1	Zinc	„	115
2	Iron	„	2372
3	Lead	„	636
4	Cadmium	„	6.0
5	copper	„	20.4
6	Nickel	„	50.8
7	Hexavalent Chromium	„	2.0
8	Total Chromium	„	52.4
9	Manganese	„	42.0
10	Titanium	„	BDL
11	Vanadium	„	BDL

The other concern of LAEC is the radiation from Indian Rare Earth. The radiation effect from this unit range between 24 to 82 micro Sv at the points starting from Gypsum yard of FACT and along the route at FACT junction, HIL, North gate of FACT, reaching at IRE southern closed gate. The maximum reading of the radiation was recorded at the southern closed gate of IRE itself. The radiation exceeds the limit and pose great health hazard. This is a matter call for immediate attention.

4. BINANI ZINC LTD, EDAYAR

BZL located in Edayar is manufacturing zinc , cadmium & sulfuric acid. The production rate is as follows.

Zinc	-	30000MT/Y
Cadmium	-	65MT/Y
Sulfuric acid	-	51000MT/Y

Raw material is imported Zinc concentrate. The approximate consumption is 66000MT/Y.

During the manufacturing process Zinc concentrate is roasted, concentrated and purified . The solid waste generated during the process is called Jerosite which is collected in the jerosite pond. Analytical data of solid waste is given in Table No:11.

Table No:11

Sl. No	Determinant	Unit	Sludge from Jerosite pond No. IV (Hazardous waste)
1	p ^H		6.3
2	Zinc	mg/kg	587.5
3	Iron		89400
4	Lead		2950
5	Mercury		0.02
6	Cadmium		355.3
7	Copper		114.1
8	Nickel		22.4

On analysis of the Jerosite , it was found that Iron, Zinc Lead, Nickel, Copper& Cadmium are present. The industry discharges 550000l/d effluent after treatment. The sludge from the effluent treatment plant is also stored in the jerosite pond.

On interaction with the local people and on inspection of the ground water sources it is found that the water sources at about 1.5Km distance from the unit is contaminated. Results of the well water samples collected and analyzed confirmed the suspicion. There are wide spread complaints from the general public regarding environmental problems due to the lechate from the old jerosite ponds. The contaminated surface run off from the industrial premises, especially in the paddy fields surrounding Chakkarachal and Edayattuchal due to the impact of lechate, is clearly visible.

5. COCHIN MINERALS AND RUTILES LTD, EDAYAR

Cochin Minerals and Rutiles Ltd is located in Edayar and established in the year 1991.

Products.

	Max.t/d
Synthetic Rutile	88
Ferric Chloride	92
Ferrous Chloride	91

Raw materials

Imenite	125 t/d
Coke	13 t/d
Hydrochloric Acid	175 l/d
FuelOil	10 KL/d
Chlorine	3.5 t/d

Waste:

In the effluent treatment plant, recovery tanks are provided for the recovery of titanium from ferrous chloride solution. The raw effluent after the recovery of titanium is taken to equalization tank and treated with lime in flash mixer. After chemical treatment the effluent is taken to slurry collection tank from where it is pumped to high rate thickener for solid separation. The overflow from the high rate thickener is settled in ageing tanks and taken to final polishing tank after pH correction. From the final polishing tank effluent is pumped into River Periyar through underground pipeline

The sludge from the high rate thickener is taken to Solids Collection Yard from where the supernatant is returned to the ageing tank.

34000 kg/day of sludge generated from the thickener and ageing tanks constitute the hazardous waste and is disposed in solids collection yard as slurry. Lime sludge generated from the lime preparation unit comes to 658 kg/day and is disposed in sludge drying beds near ageing tanks of Effluent Treatment Plant (ETP).

On analysis of the soil sample collected from the premises of CMRL and the sludge accumulated on land near the Solid Collection Yard indicate the presence of heavy metals like Zinc(70.2 mg/kg & 322.5 mg/kg) Iron (2336.1 & 2895.5), Lead (67.0 & 133.0), Cadmium (1.5 & 1.8), Copper (10.0 & 124.0), Nickel (24.3 & 53.6), Total Chromium (408.6 & 94.9) and Manganese (62.2 mg/kg & 71.4 mg/kg).

The concentration of Hexavalent Chromium in the soil sample collected near river side and solid collection yard were found to be 80.5 mg/kg and 185.60 mg/kg. respectively exceeding the concentration limit of 50 mg/kg specified in class A, schedule 2 of the Hazardous Waste(Management and Handling) Rules 1989.

The analysis details of solid waste is given in Table No: 12
Table No: 12

Sl. No.	Determinant	Unit	Hazardous waste from CMRL used for brick Making	Hazardous waste mixed with clay for making brick
1	p ^H		5.1	4.1
2	Zinc	mg/kg	493.1	176
3	Iron		352250	548.1
4	Lead		190	142
5	Mercury		0.03	0.02
6	Cadmium		8.3	5.6
7	Copper		56.4	48.1
8	Nickel		61.1	48.9
9	Total chromium		277.9	152
10	Manganese		714	328

There are wide spread complaints from the local people regarding the discoloration of river Periyar. An analysis of the river sediment from these stretches reveals that the concentration of iron and other heavy metals are higher than the permissible levels. This unit was found discharging raw effluent directly into river periyar and the committee had more than one occasion recommended closure.

6. SUD-CHEMIE INDIA (pvt) LTD., EDAYAR

The industry is located in Edayar. The unit produces the following products.

HT shift catalyst- 60 t/ month

LT shift catalyst- 20t/ month

Zinc oxide catalyst- 25 t/month

Dechlorination catalyst or Hydrodesulphurization catalyst—20 t

Raw Materials:

<u>Name of materials</u>	<u>Process where used</u>	<u>Consumption in t/day(Max)</u>
1. Ferrous Sulphate	HT Shift catalyst	8.0 MT
2. Sulphuric Acid	HT Shift catalyst and ETP	4.8 MT
3. Caustic soda	HT Shift catalyst	2.5 MT
4. Sodium bicarbonate	HT Shift catalyst	0.5 MT
5. Zinc	LT Shift+zinc oxide catalyst	1.5 MT
6. Copper	HT+ LT Shift catalyst	1.5 MT
7. Alumina	LT Shift catalyst	0.5 MT
8. Ammonia	LT Shift catalyst	1.0 MT
9. Carbon dioxide	LT Shift catalyst	2.5 MT
10. Magnesium oxide	LT Shift catalyst	0.1 MT

11. Soda ash	Zinc oxide catalyst	1.6 MT
12. Commercial Zinc oxide	Zinc oxide catalyst	1.6 MT
13. Ammonium molybdate	Hydro desulphurisation catalyst	1.0 MT
14. China Clay	Zinc oxide / dechlorination catalyst	0.1 MT
15. Lime Powder	Dechlorination catalyst	0.2 MT
16. Graphite	HT+ LT Shift catalyst	0.2 MT
17. Ammonium bicarbonate	Dechlorination catalyst	0.2 MT
18. Barium Hydroxide	Dechlorination catalyst	0.08 MT
19. Furnace oil	HT+ LT Shift catalyst	3000 litre/day
20. MTO	HT+ LT Shift catalyst	2800 litre/day

Process.

Metal carbonates and hydroxides on support like alumina are made through metal amine carbonate complex. These metal carbonates are calcined to form oxides, which are formed into extrudates or tablets.

Waste

The quantity of effluent discharge is 150 to 200 m³ per day is discharged in to the Periyar River after treatment.

The sludge generated from the effluent treatment plant containing Chromium, Zinc, Lead, Copper etc are the hazardous wastes. Waste generation per 100 tone product is 600 kg and the maximum waste generation is 50 kg /day. The company have recently constructed secured land fill as per CPCB norms for storing the hazardous waste. A roofed concrete tank is used for storing the hazardous waste. Before constructing this new tank, sludge was being disposed in open pits in the premises of effluent treatment plant by the riverside.

The analytical data of the sludge sample is given in Table No: 13

Table No: 13

Sl. No.	Determinant	Unit	Hazardous Waste
1.	PH		6.7
2	Zinc	mg/kg	14812.5
3	Lead		180
4	Mercury		BDL
5	Cadmium		6.8
6	Copper		6460
7	Nickel		201
8	Arsenic		BDL
9	Chlorides		800
10	Nitrates (as N)		1000
11	Sulphate		6390
12	Cynide		BDL
13	Sulphide		BDL
14	Free ammonia		0.36
15	Ammoniacal Nitrogen		45
16	Phenolic Compounds		BDL
17	Total Chromium		9812
18	Manganese		1030

7. MERCHEM (INDIA) Pvt LTD & MERCHEM LTD, EDAYAR.

a) Merchem India pvt ltd.

Products	: Name	Quantity(kg/day)	
		Average.	Maximum
	TMT	1300	1700
	ZMBT/Mertard	800	1500
	Mertiser	250	700
	SDMDC/PDMDC	350	1500
	SP	100	400
	TBBS	---	---

Raw materials	: <u>Name</u>	<u>Quantity (Avg. t/day)</u>
		Di methyl lamine (40 %)
Caustic Soda lye,	0.81	
Carbon disulphide,	1.53	
Chlorine .	0.77	
Process oil	0.03	
Sodium bicarbonate	0.036	
NaMBT	1.006	
Zinc Chloride	0.463	
Teritary Butyl Amine	0.077	

Sulphuric Acid	0.123
Sodium hypochlorite	0.061
Sodium sulphite	0.095
Hexa Chloro benzene	0.217
Sodium sulphide	0.179
Methylated spirit	0.158
China clay	0.256
Stearic acid	0.035
Phenol	0.050
Styrene	0.117
Fatty acid	0.030
Caustic potash	0.013
Boroquat	0.036
Ammonium Chloride	0.009
Iso Propyl Alcohol	0.0006
Di Ethanol Amine	0.0001
Styrenated Phenol	0.031
Sulphur	0.024
Xylene	0.002
Iron P. Cyanine	0.006

Process:

1. Mercure TMT:

Di methylamine, caustic soda lye and carbon disulphide are reacted in the first reactor to give sodium salt solution. The solution is then oxidized with the mixture of Chlorine & Air in the second reactor and gives the slurry of product and water. The resultant slurry is filtered and washed in a centrifuge to give wet product. This wet product is then dried in a drier and milled in a pulveriser to get dry and powdered product. This product is then weighed and packed in specified packing bags.

2. Mercure ZMBT

NaMBT solution is taken in the reactor. The zinc chloride solution is used for the precipitation of product in this reactor. The required product will be in slurry form with water, which is then filtered and washed in a centrifuge to give wet product. This wet product is then dried and milled in a pulveriser to get dry & powdered product. This product is then weighed and packed in specified packing bags.

3. Mercure TBBS.

NaMBT solution , TBA, sulphuric acid and hypo are reacted in the reactor. After the addition of caustic solution, the product containing slurry is filtered in a centrifuge to get wet product. This wet product is then dried in drier and milled in a pulveriser to get dry & powdered product. This product is then weighed and packed in specified packing bags.

4. Mertiser

Hexa Chloro benzene and sodium sulphide is reacted in first reactor to give sodium salt of PCT solution. This solution is then oxidized with Chlorine in the second reactor and gives the slurry of product and water. The resultant slurry is filtered and washed in a centrifuge to give wet powder. This wet powder is then dried in a drier and milled in a mill to get dry & powdered PCTS. This product is then mixed in Nauta mixer along with China clay, Stearic acid and iron Pthalocyanine to get a mixer. This mixed powder is then milled in a pulveriser and this product is weighed and packed in specific packing bags.

5. Mernox SP

Styrene monomer is reacted with phenol in a reactor at controlled temperature under stirring for around eight hours. This liquid product is cooled and filled / packed in suitable containers.

6. Mernox SP(E)

Styrenated Phenol and hot water is agitated in an emulsifier at controlled temperature. This liquid product is then cooled and filled / packed in suitable containers.

7. Merstabfs

Ammonium chloride and Boroquat is reacted in a reactor at room temperature by stirring for around 5 hours. This liquid product is filled / packed in suitable containers.

8. Antitack Agent VC

Fatty acid and caustic soda lye is reacted in a reactor at controlled temperature by stirring for 8 hours. This liquid product is filled / packed in suitable containers.

9. SDMDC

Raw materials are; Di methylamine, Caustic soda lye , Carbon disulphide.

Di methylamine, Caustic soda lye , Carbon disulphide are reacted in the reactor to give SDMDC solution. This liquid product is filled / packed in suitable containers.

b) Merchem Limited, Edayar

The company is producing rubber chemicals of anti oxidants and accelerators.

Name of the Products :	<u>Name</u>	<u>Quantity(kg /day)</u>	
		<u>Average</u>	<u>Maximum</u>
	F	400 kg	900 kg
	ZDC	600 kg	1500 kg
	ZDBC	200 kg	700 kg
	ZBEC	30 kg	500kg
Raw materials	:		
	<u>Name</u>		<u>Quantity(kg/day)</u>
	Carbon di sulphide	-	345
	Zinc Oxide	-	143
	Zinc Chloride	-	62
	Di ethyl Amine	-	256
	Di n Butyl Amine	-	113
	Di Benzyl Amine	-	19
	Caustic Soda	-	38
	Hexamine	-	56
	DPG	-	56
	MBTS	-	288

Process:

1. **F** is manufactured by formulation of MBTS with DPG and hexamine. The raw materials are pulverized, mixed and again pulverized.

2. **ZDC** is manufactured by reacting diethylamine and zinc oxide with carbon disulphide with C₁ as catalyst .the resultant solution is filtered, washed dried and pulverized to get ZDC.
3. **ZDBC** is manufactured in two steps.In step-1 SBDC is manufactured by reacting Di-n- butylamine and caustic with carbon disulphide.In step-2, ZDBC is manufactured by precipitation with SBDC and Zinc chloride along with dispersal-F. The resultant solution is filtered, washed, dried and pulverized.
4. **ZBEC**. sodium dibenzyle dithio carbonate(SDBC) is manufactured by reacting DBEA (di benzyl amine)and caustic with carbon disulphide. The SDBC formed is reacted with Zinc chloride along with dispersal F to Precipitate ZBEC.

Waste:

The effluent generated from the above factories is taken to the Effluent treatment plant in the premises of M/s Merchem Limited , Edayar for treatment . The combined effluent after treatment is discharged into periyar river.

A temporary facility of concrete tank with lining of HDPE provided in the premises of Merchem Limited Edayar is used for storing the hazardous waste of Effluent treatment plant sludge generated from sludge drying beds.

Sample of ETP sludge collected from the above plant has been analyzed and found that Zinc, Iron, Lead , Cadmium, Chromium etc are present.

Analytical data of the sludge is given in Table No:15

Table No:15

Sl. No.	Determinant	Unit	Sludge from drying bed
1	Zinc	mg/kg	607.4
2	Iron		5240
3	Lead		127
4	Mercury		0.08
5	Cadmium		10.7
6	Nickel		37.9
7	Total Chromium		46.4

This is a unit, which has absolutely no efficient treatment system despite the fact that its effluent is highly toxic. The committee has recommended closure of the unit after finding itself that the unit has failed to take efficient pollution control measures despite giving warning of closure. The result shows alarming high concentration of heavy metals.

8. TRAVANCORE COCHIN CHEMICALS Ltd., ELOOR

The industry is located in the Eloor industrial area .

Name of the Product/s

Caustic Soda (Lye & Flakes)	125 t/d
Chlorine	72 „
Hydrochloric Acid (commercial)	290 „
Soda Bleach	45 „

Raw Materials

:Name _____
 _____ Quantity

Raw Salt	212.5 t/day
L.S.H.S	7.00 kl/day

Process:

Electrolysis of brine by Membrane cell technology produces Chlorine and Caustic Soda. Part of Chlorine is converted to Hydrochloric acid, remaining is liquefied and sold in cylinders.

Waste:

Slurry of chemical sludge formed during the precipitation of impurities in brine is disposed in earthen sludge yard near to the riverbed. The quantity of brine sludge is reported as 25 kg/tonne of NaOH produced. Hazardous waste containing mercury is reportedly disposed in capped hazardous waste storage yard .The ETP sludge containing lead is dumped in a separate yard in company premises. The treated effluent is discharged into the down stream of Pathalam Bund in Periyar River. In waste chlorine deposit plant, waste chlorine gas is passed through caustic soda to produce sodium hypochlorite and sold as by product. The company has already stopped the Mercury cell plants with effect from 31 /07 /2004.

The analytical data of sludge sample is given in Table No: 16

Table No:16

Sl. No.	Determinant	Unit	Sludge Dumping yard
1.	p ^H		9.27
2	Lead	mg/kg	46
3	Chlorides		150000
4	Sulphate		1769
5	Cyanide		BDL
6	Manganese		1215
7	Hexa chromium		BDL
8	Total Chromium		BDL
9	Manganese		121.2

9 LEATHER TANNING UNITS.

There are three leather tanning units located in Edayar area.

- 1) M/s.Cochin Leathers Pvt Ltd.
- 2) M/s.T.M.S Leathers.
- 3) M/s.Kairaly Leather Industries.

All the above three units are having similar production ,approximately 4 tones of wet blue leather per day capacity.

Raw materials : Wet salted raw hides,
Lime,
Sodium sulphide,
Enzyme,
Ammonium sulphate,
Bate Enzyme,
Sodium Chloride,
Sulphuric Acid,
Chromium Sulphate,
Magnesium Oxide

Process:

The salted raw hides are soaked in water (to remove salt and dirt). After washing liming is carried out to remove hair using lime and sodium sulphide solution. Thereafter flesh in the skin is removed through a peeling process. The peeled skin is then washed and tanned in drum by adding chromium sulphate. The final product is the semi-finished leather, also known as wet blue hide, which is allowed to dry in stacks.

Waste:

The above units generate approx: 1500 kg/month of sludge containing chromium. Chromium bearing sludge is hazardous waste. M/s.Cochin leathers and M/s.TMS leathers have installed Chromium recovery plant which is under operation now under the initiative of Local Area Environment Committee. Similar plant is under instillation at M/s.Kairaly leathers.

The analytical reports of sludge sample is given in Table No :14

Table No:14

Sl. No.	Determinant	Unit	Sludge from Soil	Sludge from HW storage tank
1	Zinc	mg/kg	86.3	189.6
2	Iron		4300	2665
3	Lead		189	154
4	Mercury		0.05	0.03
5	Cadmium		6.3	ND
6	Nickel		47.9	55.8
7	Total Chromium		3200	3300

10. **LEAD HANDLING UNITS**

There are 3 small scale units in Edayar Area handling lead or lead scrap. Among these two units are manufacturing lead acid batteries and one unit manufacturing lead plates for lead acid batteries.

1. **Power Controls:**

Raw Materials:- Lead ingots – 3000 Kg. per month
 Lead oxide – 2000 Kg. ”

Products: Tubular Battery Plates – 330 Nos. per day

Production process:

Lead ingot is melted in an open lead-melting furnace heated by LPG burner and casted into positive and negative grid. Lead oxide pasting is applied to negative plate, pressed and cured at room temperature. The positive grids are filled with lead oxide in a separate chamber, dipped in sulphuric acid and cured. The cured positive and negative plates are charged by dipping in sulphuric acid. Plates are then washed in distilled water, dried in air and assembled.

Waste:

The wastewater generated from plate washing is highly acidic and is discharged into a pit where it is reportedly treated with lime. The treated effluent is collected in a collection tank. Lead oxide powder is seen spread all over the processing area.

2. National Battery Industries

Raw material:-	Scrap lead acid battery – 20 tone per year
Products:-	Lead acid battery – 900 Nos. per year
	Battery plates – 36000 Nos. per year

Process:

Lead is melted in melting furnace and casted to produce Lead grid. Lead oxide coating is provided and air-dried. Battery containers are brought from outside and filled with Acidic water (Sulphuric Acid and water) and charged.

Waste:

Lead residue from melting furnace 200 kg/month (category 9.1) and waste plastic containers are reported to be disposed to re-processing units. The waste water generated is discharged into land without any treatment. Lead slag contained in polythene bags is kept in the factory premises.

3. Abco Accumulators

Raw materials	:Scrap battery – 5500 kg /month.
Product	:Lead – 3000 kg/month.

Process:

Lead is made from lead plates for lead acid batteries from dry scrap batteries. Process consists of heating the dry scrap battery plates with charcoal in a furnace. Battery plates consists of free lead and lead oxide. Lead oxide is reduced with charcoal to form lead. This is fed into the furnace again. The fumes evolved from this is collected through a duct and passed through water in a closed chamber for scrubbing the fumes and released through a chimney.

Waste

The industry is generating lead containing slag, which is disposed of as waste.

In order to assess the impact of these units, soil samples were collected from the surrounding area. Concentration of lead in the sample was found high (424 mg./kg.)

12. FACT (UD), ELOOR

Raw material	:Naphtha	673 t/day
	:Rock Phosphate	325 t/day
	:Furnace oil	135 t/day
	Sulphur	194 t/day
Products	: Sulphuric Acid	600t/day Sulphuric acid and 550tonnes/day combined capacity SO ₂ /acid
	: Ammonia	900t/day
	: Phosphoric acid	100t/day
	: Ammonium Sulphate	682t/day
	: Ammonium Phosphate	450 t/day
	: Carbon dioxide	1007t/day
	: Gypsum	500 t/day

PRODUCTION PROCESS:

1. Sulphuric Acid.

The process consists of Sulphur melting, Combustion of sulphur-to-sulphur dioxide, Catalytic conversion of sulphur dioxide to get sulphur trioxide, Intermediate absorption of Sulphur tri oxide in concentrated Sulphuric acid to produce Sulphuric Acid, Final conversion of unreacted Sulphur dioxide to Sulphur trioxide and final absorption of Sulphur trioxide in concentrated Sulfuric acid

2. Ammonia

Process involved in the production of ammonia are: Desulphurisation of Naphtha, reforming of the desulphurised hydrocarbon ,gas purification,conversion in to ammonia by catalytic reaction .

3. Phosphoric Acid

Phosphoric acid is manufactured by wet process by the reaction of rock phosphate with sulphuric acid.

4. Ammonium Phosphate

Phosphoric acid, Sulphuric acid and gaseous ammonia are fed to a saturator and agitated. Further addition of ammonia is done in the second saturator. The neutralized product is a thick slurry and flows to a blunger where it is mixed with undersized granules;

crashed granules and recovered dust, along with some urea. The granulation takes place in the blunger. Liquid ammonia is injected to the blunger. The granulated wet product is dried.

5. Ammonium Sulphate

The Ammonium sulphate solution fed to the unit consisting of two separate streams from the Caprolactum Plant of Petrochemical Division .One feed stream is Lactum ammonium sulphate solution and the other feed stream is Oxime ammonium sulphate solution. The process includes Concentration and crystallization, dewatering and drying& cooling

Waste

Hazardous wastes generated from the factory are spent catalyst from sulphuric acid plant and ammonia complex, sulphur muck from sulphuric acid plant, gypsum from phosphoric acid, and sludge from effluent treatment plant.

The analytical data of Gypsum sample is given in Table No: 17

Table No :17

Determinant	Unit mg/kg	Concentration
Zinc	„	16.64
Iron	„	634
Lead	„	34
Cadmium	„	6.4
Copper	„	6.2
Nickel	„	13.4
Arsenic	„	BDL
Flouride	„	368
Phosphates	„	391
Cyanides	„	BDL
Sulphides	„	BDL
Phenolic compounds	„	BDL
Hexavalent Chromium	„	BDL
Total Chromium	„	BDL
Titanium	„	BDL

CONCLUSION

The current study was conducted to assess the effect of heavy metal and pesticide in environment of Eloor –Edayar area. Results of the samples collected from Eloor-Edaar and Kuzhikkandam thodu indicates the presence of heavy metals and diverse mixture of organochlorine compounds. The effluent from the industries like HIL, Merchem Limited, Eloor and partially from FACT (UD) are directly discharged in to Kuzhikkandam thodu. The discharge from Kuzhikkandam thodu is reaching Edamula branch of periyar, which ultimately merges in to river Periyar at Eloor ferry. The diversity of chemicals in the thodu is of complex nature. It require in depth study to identify the individual compounds. In the absence of such a study, the true and actual extend of damage to the thodu and surrounding area by the release of hazardous chemicals to the environment is practically difficult. These units have therefore major roles in polluting river periyar along with other units such as CMRL and Binani. The major units discussed above have played a greater role in contaminating ground water in Eloor-Edayar. Even the soil has been rendered totally useless for any agricultural operations. The presence of heavy metals in paddy plants speak itself the extent of contamination of the soil and its reaches. These disturbing results do have its impact on the health of the people and animals.

The people mostly from the lower strata of society depending agriculture and fishing have lost their very means of livelihood not to speak of the basic elements to sustain life such as drinking water, air and shelter. The overall environmental impact as indicated by this limited study has rendered the Eloor-Edayar industrial belt unfit for habitation for it has impaired irreversibly the quality of environment. The polluters however remain deaf and dumb and the regulatory body cannot afford to be any longer indifferent.

The indiscriminate and inhuman approach from the side of industries perhaps cannot find any parallel despite the earnest effort taken by the Supreme Court Monitoring Committee for enforcing the directives of the apex court. The major industries and the Pollution Control Board owes an explanation to the people for the presence of metals like Iron (224mg/l), Cadmium (0.01mg/l), Manganese (0.3mg/l), Nickel(0.01mg/l)and copper(0.03mg/l) in the river water, with the accumulation of Zinc(13270mg/kg), Nickel(126mg/kg), Iron(223750mg/kg), Cadmium(98mg/kg), Copper(343mg/kg), Lead

(323mg/kg) and Total Chromium (1054mg/kg) in the river sediment, despite the environmental laws which has been enacted to prevent the environmental deterioration.

People in Eloor-Edayar crave for justice. They want air to breath. They want water to sustain life. They want land for agriculture operation to make a living. They were there even before the industries. The industries flourished and the people perished. People lost not only their property but also even their health, future, and even the future of their off springs. Thanks to the system that systematically failed the law.

Adv. P.K. Ibrahim
Chairman, LAEC

A. Farook Sait
Convener

Jacob V. Lazer
Member

Purushan Eloor
Member

V. Satheesan
Member

K.A. Joseph
Member

S. Jayathilakan
Member

M. Ashokan
Member

MINUTES

92nd meeting held on 13/10/2005, Thursday at 2.30 am at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

Chairman LAEC informed the committee that he received a letter from CII, nominating a new person Mr.V.Satheesan, Associate Manager (Safety and Environment) Apollo Tyres, in place of Mr. Anand who left CII. Since the copy of the said letter has already been marked to SCMC, this communication was not forwarded to SCMC. However when Dr. Claude Alvaris, member SCMC visited Kochi, this matter was taken up with him. He directed chairman to accept the nomination of new member and invite him to all future meetings of LAEC. In these Circumstances Chairman reported to the committee that Mr.Satheesan nominated by CII will here after be the representative of CII in LAEC and that he shall be invited to all future meetings. A communication to this effect will go to Mr.Satheesan and to the association he represents.

Chairman further reported that the SCMC member Mr. Dr Claude Alvares has directed him to include the member nominated by the Edayar Small-Scale Industrial Association. SCMC directed to allow Mr. Asokan to continue in the committee until further orders. In view of this Chairman reported the committee that the member nominated by the association Mr. K A Joseph as per their letter dated 4-6-05 is included in the committee and that communication to that effect will be issued to him.

Resolution - No.1

Members Mr. Purushan and Mr. Jayathilakan invited attention to the press report raising certain allegations against LAEC by the Edayar Small-Scale Industrial Association (ESSIA). A copy of the press release issued by the association is also placed before the committee. The committee takes strong exception to the allegations made by the Secretary in the press statement being totally baseless and unfounded. The committee takes serious note of the statement that its members have threatened the industrial units to promote their vested interest and that the industries failing to oblige LAEC are being issued proceeded with orders of closure. The allegation being very serious especially in the context of the demand for vigilance enquiry ,the members resolved to address a letter to the Secretary Mr. M.N Raveendran of the Edayar Small-Scale Industrial Association to disclose the

names of the member/members of LAEC who demanded money from the units and the names of the units which have been proceeded with for not obliging to such demands. Such a statement would enable the committee to take appropriate action.

The committee also deliberated the complaint submitted by Mr. Asokan that he was ridiculed by Mr. M.N Raveendran, Secretary of the Edayar Small Scale Industries over phone using foul languages and threatened him with dire consequences in near future. The incident happened on 11-10-05. The Edayar Small Scale Industries Association being a responsible organization and Mr. Raveendran being its secretary should have shown better civic sense and acted with maturity. The committee condemns such action. The committee further resolved to seek his explanation over his conduct.

The committee also resolved to write to SCMC appraising these incidents and seek guidance as to how LAEC should deal with ESSIA and as to whether the Association membership should be allowed to continue by replacing with a new nominee. The committee requested the Chairman to address a letter to Mr. Ravendran informing him the committee's displeasure and seeks his explanation for being reported to appropriate authorities.

Resolution No2.

The committee discussed the report appeared in the press on 8-10-05 regarding the colour change in Periyar indicating illegal effluent discharge. Dr. Claude Alvares member SCMC was also visibly disturbed over the news. He directed the Committee to enquire into the reported illegal discharge and report to SCMC for further action. He made it clear that no leniency should be shown to the unit which is found guilty for the illegal discharge. Chairman LAEC contacted the MD of CMRL and enquired with him whether the unit has made any discharge breaching its undertaking to LAEC. The MD asserted that there was absolutely no illegal discharge from his unit and that the committee can check up that fact from the outlet and the area all along where the pipe has been laid leading to discharge point. The unit also raised their doubt that it could be a calculated move from some source that is enmical to their unit. The incident being on 9-10-05 when the members were engaged in the function arranged to submit the audit report to SCMC, prompt action to detect the source of discharge could not be made. At this distance of time without any clinging evidence it is difficult for the committee to fix the liability on any particular unit.

In the circumstance the committee resolved to keep a close watch on all companies that have discharge point into river Periyar.

Mr. Jacob Lazer Member LAEC placed a suggestion before the chairman that there was already a direction by PCB to CMRL to shift their discharge point to Pathalam bund. According to him the pipe leading to discharge point is laid along the side of the Chakalath thodu. The Company should be directed to provide the discharge point at the junction where it meets the Chakaloth thodu and the chakaloth thodu should be given an opening right near the bund enabling the discharge down the bund. The suggestion of Mr. Jacob Lazer was placed before the committee. The committee found the suggestion workable and more prudent. The committee therefore unanimously recommends to the Board to direct CMRL Edayar to provide outlet at the junction where their pipeline carrying treated effluent to discharge point meets the chakaloth thodu, be made the legal outlet, which should be protected by a inspection chamber for taking samples of the discharge. The pipe beyond such discharge point should be directed to be dismantled. The Board may issue orders to the company without any delay.

93rd meeting held on 27-10-2005, Wednesday at 9.00 a.m. at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

Resolutions

Chairman welcomed Mr. Joseph member nominated by ESSIA to LAEC and briefed him about the method of functioning the LAEC. Chairman gave a brief sketch about further follow up action pursuant to the submission of the report. The committee resolved to inspect the units which have been granted time to implement pollution control measures. The committee also constituted a sub committee consisting K.A Joseph and Purushan to follow up the action on blocking the road to prevent direct access to Periyar for illegal activities. The committee will give its compliance report fixing the post within one month. The committee would also meet the District Collector for final orders on allotment of land for river monitoring.

Chairman appraised Convenor the necessity to shift the legal outlet of CMRL to Chakala thodu and compliance on the resolution of committee in this regard. Convenor assured appropriate action.

Chairman informed the committee that SCMC has asked him to ignore the public utterances of the ESSIA and go ahead undeterred with any such comments. Dr Claude Alvares further told the Chairman that once the member of the association start attending the meeting the association would mend itself and doubts if any on LAEC functioning would be cleared. In view of this, Chairman informed the committee that he did not address any letter to the association seeking details on the allegations leveled by them against members.

LAEC has released the Environmental Audit Report on 8-10-05. The report prepared contains 490 pages. It was practically difficult to complete the works in time without engaging an expert computer operator. In this circumstances the committee entrusted the Chairman to make arrangements for availing the service of a computer operator.

Shri. Josemon .P.T, Pazhampillil (H), Maradu is an expert in the field. He was working in this office from November 2004 to June 2005. Hence the service of Shri. Josemon was made available from 1-8-05 to 30-9-05 for completing the works. Considering the heavy work load and the works attended by him during holidays and night time an amount of Rs.5000/- per month has been paid to him for August & September 2005. The action taken in engaging Shri. Josemon and payment given to him is hereby ratified by the committee .

LAEC has released the Environmental Audit Report on 8-10-2005. The office of the LAEC has equipped with only one computer system. The report prepared contains 490 pages. It was practically difficult to complete the works within the limited period with the available one computer. In these circumstances the committee entrusted the Chairman to make arrangements for hiring one computer. Accordingly local enquiry was made and hired one computer at a rent of Rs.250/- per day. M/S. Jermy's Vision, Broadway supplied the system at the above rent. Later the committee in its 93rd meeting held on 27-10-05 ratified the action taken by the Chairman. The additional work was completed in ten days time. The committee also decides to pay an amount of Rs.2500/- towards rent.

94th meeting held on 5-11-05, Saturday at 4pm at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

The committee evaluated various aspects and has resolved to suspend the inspection of the industrial units for one month and request the Board to take appropriate action on the recommendation made by the committee in the final report in respect of each individual unit and ensure the effective implementation of the pollution control measures. The committee on 10th of December 2005 will review the steps so taken by the Board by making a final all-round inspection of all the industries. The Board in the meanwhile also may give action taken report on each individual industry for being reported to SCMC while suggesting other measures to make up the deficiency.

The committee in the meanwhile will collect samples preparing a road map of the Eloor-Edayar Industrial belt to give a final shape to the environmental impact assessment. This study will include damage done to the land and water bodies such as river and its creeks.

The committee also found that the Board is yet to issue clearance to certain units, which has been recommended for closure for want of proper treatment system, in spite of implementing pollution control measures. The committee takes a serious note of this aspect and resolved to conduct a joint inspection of those units, which have reportedly implemented pollution control measures after the committee recommended closure of those units. In the joint inspection by the LAEC and officials of the Board, if the measures implemented are found to be sufficient, the Board should be asked to issue necessary consent/ clearance for its operation.

LAEC sought clarification from the Convener Mr. Farooq Sait regarding the communication sent by the Board in the matter of collection of fees for sample analysis taken from Kuzhikandam Thodu, river and paddy filed etc. The convener would report to the committee from whom such fees shall be levied.

The committee also resolved to recommend to the Board to constitute a Local Environmental Surveillance Committee (LESC) to ensure that the industrial units in Eloor-Edayar belt continue to comply by the pollution control measures and the officers of the

Board is alerted to take action as and when breach of environmental law is detected and noticed. The committee suggests the following aspects to make LESC effective:

11. LESC shall consist of at least two members from two reputed Non Governmental Organization working in Eloor-Edayar industrial belt and the Environmental Engineer or the Office-in-charge of the Pollution control office at Eloor-Edayar as Ex-Officio member.
12. The members should be provided with identity cards to enable them to inspect the industrial units in Eloor- Edayar belt, take samples, examine records, prepare mahzer , seize articles etc.
13. The members should be given an honorarium of Rs.2000/- and Rs. 500/- as traveling allowance.
14. The NGO nominating it's representative will be at liberty to recall a member and substitute with another if there is any allegation of misconduct. The members nominated by the NGOs shall hold office for a period of 2 years unless he is removed for proved misconduct or resigned or recalled by the organization.
15. The members can seek to substitute the Environmental engineer/ Person-in-charge of PCB office at Eloor, if they are of the opinion that the said officer is not taking action against the erring unit despite proved violation of environmental laws. The LESC shall be provided with an office attached to the office of the PCB at Eloor.
16. The Environmental Engineer, Eloor, shall forward the samples taken by the LESC for analysis to the Central Laboratory of PCB or to such other labs.
17. LESC will conduct inspection on receiving complaint from the local community or *suomoto* and a copy of the report of the inspection on request should be given to the complainant.
18. LESC should be involved in disaster management conceived for industrial area.
19. LESC will monitor the surrounding areas of Eloor-Edayar Industrial estate, the creeks of the river, river Periyar and other water resources and will endeavor to protect the environment and improve its conditions.
20. LESC shall also be authorized to inspect the vehicles carrying industrial products, raw materials and or wastes to ensure whether the transportation is genuine and the documents are proper. If any suspicion arise, the same shall be reported to the Local Police and PCB for ensuring that the transportation is genuine and is under valid documents supporting the movement.

The committee resolved to forward this recommendation to SCMC to direct the Board to constitute committee for post LAEC monitoring by the civil community.

95th meeting held on 11-11-05, Friday at 5pm at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

The committee discussed the out come of the meeting convened by the Board on Kuzhikkandom thodu cleaning work .The meeting called by the Chief Environmental Engineer, Regional office Ernakulam was attended by Members of LAEC Mr. Ashokan and Mr. Purushan and representatives of Periyar Malineekarana Vrudha Samathy. The CEE, SEE, EE, and AEE represented the Board. The CEE distributed a project report submitted by FEDO .The meeting concluded without any concrete resolution.

It may be recalled that the SCMC has directed PCB to undertake the cleaning work of Kuzhikkandom thodu on war footing and complete the cleaning process by 31st December 2005 .The date itself was fixed taking into account the monsoon season also .The direction of SCMC issued as early as May 2005 is yet to make any headway. SCMC has asked the Board to involve LAEC .The life of LAEC itself is extended to accomplish this task within the time frame. In the circumstance, having regard to the slow pace of the steps perceived by LAEC, the committee resolved to take initiative and call a meeting of all concerned to discuss the cleaning schedule of the Kuzhikkandom thodu.

LAEC in fact had made a beginning and as a follow up of the discussion held with the Chairman of PCB, the committee suggested three names of experts to be involved in studying the impact of decontaminating the Kuzhikkandom thodu .The committee has already handed over their names in its 81st resolution. Unfortunately no action is seen taken on the said resolution. When the member secretary attended LAEC meeting, the matter was again brought to his notice and he assured that the experts named by LAEC would be associated with FEDO.

The report of FEDO on Kuzhikkandom cleaning, to say the least, totally lack details on the precautions to be born in mind before undertaking the cleaning work of such a massive operation of hazardous waste. The committee expresses its anxiety in going ahead with the FEDO report without further study by experts. The committee also feels that a meeting of all concerned has to be called to discuss threadbare the cleaning issue at its initiative lest the matter will be unduly delayed .The committee therefore resolved to call a

meeting inviting the Chairman, Member secretary, and other Board officials along with the companies on 19-11-05 at 2 PM.

The committee decided to conduct soil sampling from various parts of Eloor-Edayar industrial belt to assess the damage to the land. The Board shall make available sampling equipments to LAEC by 15.11.05. The committee will compile various lab reports to enable the PCB and CPCB or any other agency to assess the extent of damage caused to the land and river by the industry to fix their liability for taking remedial measures including compensation to the local residents for the loss of their water resources and agriculture lands. This should be completed by 20th December 2005.

96th meeting held on 17-11-05 Thursday at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

Resolution No.1

This meeting was convened to review the actions so far taken by the Board in the matter of cleaning up of Kuzhikandam Thodu. Mr. Vijaya Bhas, Chief Environment Engineer and Mr. Hanz Raj, Sr. Environment Engineer, was specially invited to the committee to brief the members on this aspect. Chief Environmental Engineer Mr. Vijaya Bhaz apprised the committee that FEDO was asked to give a project dealing with procedure of cleaning up of Kuzhikandam thodu and to estimate the approximate cost of the cleaning process. He conceded that FEDO has not been asked to undertake any pilot cleaning to assess the exact nature of impact in the Environment. Chief Environmental Engineer pleaded ignorance of the LAEC's recommendation for involving experts with FEDO to prepare a comprehensive impact assessment study relating to the Kuzhikandam Thodu cleaning up.

Chairman, LAEC updated the PCB Officials inviting their attention to various recommendations of the LAEC and the assurances given by the Chairman of the Pollution Control Board and Member Secretary of the Pollution Control Board when they attended the LAEC Meeting. The committee's recommendation to involve the experts identified by it is yet to be acted upon. LAEC Chairman expressed total dissatisfaction over the slow pace of the actions to clean up the Kuzhikandam Thodu. Chairman stressed that by the end of December 31st 2005 the cleaning up processes is supposed to be over and that we

have not even made a beginning, which demonstrates total indifference to the implementation of SCMC Order.

The committee therefore requested the Board to take further earnest efforts in the matter of cleaning up Kuzhikandom Thodu .To start with, the Board may call a joint meeting of LAEC, PCB, FEDO and the experts in hazardous waste including those names furnished by LAEC in its 81st meeting held on 28-8-2005. The committee resolved to take a convenient date from Dr. R Gopichandran and Dr. A.A Khan and fix a date for the proposed joint meeting. The meeting proposed is for expert advises on the cleaning up process. The representatives of the Panchayath is herefore need not be insisted in the said meeting. Committee felt that since the direction to cleanup the thodu is to the PCB, involving LAEC, wide discussions need not be held for every aspects.

97th meeting held on 25-11-2005, Friday at 4.30 pm at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

Chairman LAEC reported that he contacted Dr. Gopichandran and Prof. A.A.Khan for their available date. They have consented for meeting from 1-12-2005 to 3-12-2005. PCB officials may formerly invite them to the meeting, which can be fixed on 2-12-2005. The PCB can work out the details of the joint meeting proposed on 2-12-2005. As experts, it was decided to invite Prof. M.K.Prasad, Dr.Chandramohan, Dr. Madhu and Dr. C.Jayakumar ,Dr. Gopichandran and Dr. A.A. Khan. Site inspection should be arranged for the experts before the meeting so that the discussion should be more concrete and the experts will be able to appreciate various points of discussion.

The committee expressed it's unhappiness over the delay in communicating the confirmation letter to the Water Authority by the PCB even after the Water Authorities submitted their estimate of the cost for lying the pipelines for water connection to affected peoples in a record time of one week bearing in mind the directions of the Supreme Court Monitoring Committee. The Chief Environmental Engineer assured to the committee that he would soon write to the Water Authority confirming their estimate. The Chief Environmental Engineer also assured the company to raise the fund of Rs. 1 Crore from four companies at the rate of Rs. 25 lakhs each and arrangements will be made to deposit that amount to the Water Authority. It is also resolved to limit the water supply to each

consumers at 500 Ltrs. And consumption in excess of that will be at the cost of each consumer. The companies should engage persons to monitor the water connections and check whether any consumer tampers with the meter. It is also decided to collect ownership certificate of the affected consumers for submission to the water authority to effect water connection. It is resolved to call a meeting to discuss the water supply scheme on 6-12-2005 with Water Authority at the office of the Pollution Control Board and review all the actions taken thereon till that date. The Board shall call the said meeting.

Chairman LAEC informed the committee that he got information about the illegal discharge of untreated effluent in an open place in Wallayar and that the local people seized three vehicles, which carried the effluent. It is reported that the effluent is transported from CMRL. To ascertain the true fact, he instructed LAEC members Mr. Asokan and Mr. Jacob.V. Lazer to go to the spot taking Mr. Shanavas, Scientist and collect the samples of the effluent discharged. LAEC member Mr. Asokan and Mr. Jacob Lazer reported that they could collect only the soil samples where the effluent was discharged. They also reported that Police have registered a Crime in relation to the incident. PCB Officials reported to the committee that their office at Palakkad is enquiry into the incident.

Mr. Purushan Eloor invited the attention of the committee to the fugitive emission reported from Endosulfan plant of HIL on 16-11-2005. Chief Environmental Engineer Mr. Vijayabhas has reported that the company is using one of the incinerators for incinerating hazardous waste and that the leak reported is a mistake happened in the process. The Board has already issued show cause notice to HIL. The committee decided to inspect HIL tomorrow i.e. on 26 – 11-2005.

LAEC take strong exception of the news appeared in the press on 23-11-05 and its content. The report says that the Board is not for any closure action against the industry. CEE and convener pleaded innocent of the news item. They also expressed their concern over the news items coming frequently in press quoting PCB. The chairman informed the committee that the content of the report if true is a matter that require to be brought to the notice of the SCMC and Supreme Court since it find fault with these institutions for closure orders of units found violating laws. The committee therefore resolved to take up the matter with the Chairman and member secretary and find its source. The Board has

not denied the report, which is militating against the Boards. However the matter should be taken up with chairman.

The Chief Environmental Engineer reported to the committee that he is reviewing the actions on the recommendations of LAEC on individual industries and following up the same to ensure that all units implement pollution control measures.

98th meeting held on 1-12-05, Thursday at 4.30 p.m. at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

Chairman appraised the committee about the office order dated 24-11-05 assigning duty to Mrs. ChitraKumari, Environmental Engineer deputed to LAEC at Eloor Office. Though the letter is dated 24-11-2005, the copy marked to LAEC was send only today. Chairman informed the committee that he has already spoke to PCB Chairman that Mrs. Chitrakumari cannot be spared now as she is already in the process of sampling the soils for environmental assessment study and the order has not spelt out her continuance in the committee which is an action against the direction of SCMC to maintain status quo. Chairman PCB assured that she will continue to be with LAEC and that if the order has not spelt out that, he will issue fresh order to that effect.

The committee decided to take experts to kuzhikandom thodu before the meeting and members should be present

99th meeting held on 7 -12-05 at 5pm at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

Resolution No: 1

The Committee wanted to know from the convener Mr. Farook Sait and Mr. Vijayabhas Chief Environmental Engineer, about the steps taken in the water supply matter to the affected peoples of Eloor Panchayath in pursuance to the decision taken in the last meeting of the LAEC. It was decided in the last meeting that the Board shall call a meeting at the PCB office to discuss the water supply scheme. According to the Chief Environmental Engineer the said meeting could not be arranged. He also reported that letters to the company also could not be sent asking the industries to deposit the required money towards the estimated cost of water supply. The Chief Environmental Engineer further reported that he discussed with his Boss (Member Secretary) and the Member

Secretary told him that this a matter to be taken up the local Gram Panchayat and further actions can be taken only there after .

The committee strongly disapproves the manner in which the Board is lagging the issue on one pretext or the other. LAEC was asked to complete the survey of the affected parties to supply water. The committee completed its work in 10 days time and the same was submitted to the Board. The further follow up action even after 3 months of the said report from PCB side is slow. The Board was directed to collect the fund for water supply by SCMC long back. It is difficulty to comprehend any reason for not collecting the required fund from the companies. The delay in collecting the fund will certainly have a fatal effect in supplying the water to the affected community. LAEC therefore remind PCB that all steps to supply water to the affected community be taken without any further delay failing which the Board will be held responsible for delay and the laxity on their part will be brought to the notice of SCMC for this is an issue directly connected with the people's right to live. The attempt of PCB to advance lame excuses such as prior consultation with Panchayath will not be appreciated, as LAEC do not think that Panchayat has a different opinion to ensure water supply to its people.

It is brought to the notice of the convener that the lab analysis of the soil sample is being delayed and if there is any dearth of staff that should be met with temporary hands as was directed by SCMC.

Mr. Purushan Eloor raised his concern about the functioning of the Endosulfan plant in HIL. According to him HIL has got no treatment system to treat approximately 4000 liters of water containing Endosulfan, which is suspected to contain 680 microgram per liter. Chief Environmental Engineer reported that the Board has already written to the company that it should follow strictly the directions of SCMC. He however did not make any sampling analyzing to study the efficiency of the plant. He undertakes to study the efficiency of the effluent treatment plant immediately and intimate to the LAEC its result.

The direction of SCMC to the HIL on incinerating halogenated compounds in the new incinerator of HIL was also discussed. The Board will ascertain whether any such communication has gone to the unit and if not necessary communication will be send and Board will ensure the compliance of the SCMC direction. Chief Environmental Engineer

also reported that he has directed HIL not to incinerate any hazardous materials in the present incinerator, as it is not confirming the CPCB norms.

Convener Mr. Farook Sait reported that already two letters have been sent to the CMRL directing to shift their outlet to Chakkala Thodu. He is following up the matter. The action taken against Merchem Ltd consequent to the seizure of illegal transportation of hazardous waste in barrels violating the conditions of authorization under hazardous rules will be reported to the committee in the next meeting.

100th meeting held on 16-12-2005, Friday at 5.30 pm at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

The communication received from Dr. Gopichandran Scientist Centre for Environment Education, Ahmedabad in relation to the question to be placed before the CPCB on the alternate proposal of containment of pollution of hazardous waste in Kuzhikandam Thodu was read in the meeting. It is resolved that this communication be shared with Prof. M.K. Prasad and request him to furnish a comprehensive questionnaire for submission to the CPCB. The questionnaire should contain all areas of concern on the proposed alternative suggestion of the Panchayath (namely to bury the hazardous in the thodu itself and cap it) and its impact on environment. Mr.Jacob.V. Lazar will contact Mr. M.K. Prasad and will collect the questionnaire in a week's time.

It is reported to the committee that the soil sample collection from Eloor as per the road map prepared for the assessment of the environmental damages is almost over and that similar exercise should be undertaken in Edayar. Chairman reported that Mrs. Mrs.Chithrakumari , Environmental Engineer and Mr. Soman has been asked to prepare the sampling soils for Edayar. The sampling in Edayar will commence from Tuesday.

The committee has not received the minutes of the joint meeting held at Abad Hotel on 2-12-05 convened for discussing issue relating to Kuzhikandam Thodu cleaning up project. Convener is requested to collect a copy of the minutes and make available the same at the next meeting.

101st meeting held on 24-12-2005, Saturday 11 A.M at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

Resolution No. 1

The committee evaluated the overall situation in Eloor –Edayar industrial belt. The committee expressed satisfaction over the pollution control measures implemented by the companies such as Sud-Chemie India Pvt.Ltd, Njavallil Latex Pvt. Ltd, Ramanand Electrocoats, Cochin Alloys , Minanr Chemicals , Sakthi Paper Mills ,Bone Meal Units, Binani Zinc Limited and Travancore Cochin Chemicals Limited. The committee therefore resolved to call a meeting of these companies to honour them in recognition of their positive response to improve the environment in the industrial belt. LAEC appeal to the other units in Eloor –Edayar belt to adopt pollution control measures with a competitive mind.

Resolution No. 2

The committee expressed its deep anxiety over the disturbing incidents of the discharge of trade effluents into Kuzhikandam thodu by companies like Merchem Ltd, Eloor and HIL, Eloor, causing serious concern to the local residents. LAEC members and PCB officials deputed to LAEC inspected Kuzhikandam thodu and collected samples for analyzing. The lab analysis of these samples indicates the character of untreated trade effluent of Merchem Ltd, Eloor.

Merchem Ltd Eloor is a major problem unit. LAEC during its inspection in December 2004 detected its clandestine discharge of trade effluent into Kuzhikandam thodu using deceptive methods. The unit was also found not having an efficient Effluent Treatment System. The unit, which started in 1997, has been a cause for serious concern to the local residents due to the Air and water pollution from this unit and the PCB had issued dozens of Show-cause notices and temporary closure orders on the complaint of the people. LAEC therefore focused its attention for a permanent solution to the recurring problems arising from this company.

The finding of the LAEC that this unit had been functioning without an adequate effluent treatment plant has been vindicated by the report of Central Pollution Control Board. The Central PCB in the circumstance suggested to introduce multi-evaporator system and Reverse Osmosis system for treatment of high toxic inorganic effluents.

The company though resisted all along for such a foolproof system on the plea that its effluent treatment system is efficient, ultimately had to concede for introduction of Multi-evaporator system and RO system.

After the introduction of a proper efficient treatment system by the company, LAEC thought that the problem has been effectively tackled. However that was only short lived. The company was found not using the newly installed treatment plant and was attempting to bypass the treatment by allowing the untreated effluent to be discharged in the open land rather than directly to Kuzhikandom thodu. The samples collected from the pit in the open land of the Merchem Ltd got analyzed in the Central Laboratory of the PCB at Ernakulam and found that the parameters of BOD, COD, Suspended solid, TDS, Iron, Chloride, Sulphide etc beyond all tolerable limits. The committee therefore recorded a finding that it is discharging major quantity of raw effluents into the open land maintaining the ETP of zero discharge for a minimum quantity of effluent only so as to make it appear that the company is observing zero discharge. LAEC also found that the officers posted in the company for monitoring the unit totally ineffective. The committee in the circumstance resolved in its meeting on 10.06.2005 (minutes of the 65th meeting) thus:

“The new system introduced by the company needs to be closely monitored continuously round the clock at least for two months. By such monitoring alone, one can assess the total physical quantity of the product, the total quantity of the effluent generated each day, the total capacity of the Effluent treatment system of zero discharge and the total quantity of sludge generated each day in order to assess whether the Zero discharge system is functional and financially feasible so as to avoid clandestine discharge of untreated effluents.

To undertake this exercise, one must admit that the PCB has no sufficient staff strength on its roll. LAEC is of the opinion that 6 persons (at the rate of 2 persons per 8 hours) have to be engaged for supervising and monitoring the unit for two months under its supervision. This should be in addition to the monitoring of the Board. Appropriate order can be issued in the light of the monitoring report of this unit by LAEC.

The company, having adopted ETP of zero discharge as claimed by it, simultaneously should be asked to execute a bank guarantee of Rs 10 lakhs for being forfeited in the event of resorting to any illegal discharge of untreated effluent into open

land. It appears that companies claiming zero discharge resort to discharge of raw effluent with impunity.”

SCMC considering the above recommendation issued the following directions in the letter dated 12.07.2005 addressed to Chairman, PCB to ensure that Merchem Ltd, Eloor strictly comply by the Pollution Control measures by putting in operation the new system.

“The 60, 62 and 65 minutes deal with a surprise inspection of Merchem Ltd., Eloor and related issues concerning this unit. The surprise visit established that illegal dumping of hazardous wastes was being carried out by the unit, bypassing the zero discharge system requirement that has been installed pursuant to orders of the High Court dated 2-2-2005, SCMC and CPCB directions. Samples of the untreated effluent were taken and these were analyzed at the Central Laboratory at Gandhi Nagar and the analysis report (62nd meeting) indicates that the system is being bypassed.

The Evaporator and RO system installed by Merchem Ltd, Eloor is reported to be sufficient for treating the chemical effluent. The company, in order to save the operational cost is apparently by-passing the above system. Both RO and MEE system should be fully functional to ensure zero discharge. Therefore, from the experience of SCMC in other states, the following suggestions may be thought of as directions to the Company by the KPCB to ensure the watertight operation of RO system and MEE Evaporator system:

- a) There should be a sealed meter inside the premises of Merchem Ltd., at the intake point of water from the Travancore Cochin Chemicals Ltd. (TCC) to ascertain the total quantity of water intake by Merchem.
- b) At the point of process intake, a sealed water meter should be installed for ascertaining the total intake of water for process alone.
- c) There should be a separate sealed electric meter exclusively for the operation of RO system and another one for the MEE system to ascertain the consumption of energy.
- d) In the event of failure of RO system or the MEE, the Company must inform the PCB immediately and the reading of all meters should be intimated to the PCB.

- e) The Unit must be directed to keep a schedule of back wash of sand filter and activated carbon filter.
- f) The Unit must be directed to install flow meter with recorder in the feed lines and outflow lines of the RO and the MEE if these are not installed.
- g) Over and above these suggestions, Dr. D.C. Sharma, Zonal Officer of CPCB may be consulted for suitable suggestions to be insisted for the regulatory body to ensure that the RO system and the Evaporator System is actually put to use by the Unit.

The LAEC has recommended bank guarantee of Rs.10 lakhs to be taken from the company and the company to be placed under special audit of the Kerala Pollution Control Board to establish the exact throughput so that the company will forfeit the bank guarantee if the system is bypassed again. The Sub-Committee finds that the bank guarantee of Rs.10 lakhs is reasonable. However, exact quantum of bank guarantee may be discussed in consultation with Dr.D.C. Sharma, Central Pollution Control Board. Dr.Sharma should also be requested to work out the terms and conditions of the environmental audit, which would ensure the quantities to be processed in the waste management system at the production rate of 3.3 tonnes per day. Any further discharge on land will also attract the provisions of Section 16 (3) of the Hazardous Wastes Rules, 1989 in addition to bank guarantee being forfeited.

The LAEC has also recommended that for efficient monitoring of the Kuzhikkandam Thodu, the wall constructed across the Thodu on the western side of the Merchem boundary by Merchem shall be removed. Construction of this wall is leading to abuse and restrains the public and the Pollution Control Board officials from access to the Thodu and thus enables illegal discharges of hazardous wastes. The Kerala Board will direct the removal of the wall within the period of one week of this communication, failing which it will ensure removal of the wall at the cost of the company. The scheme of removal should be seen as part and parcel of the clean up of the hazardous wastes lodged in the Thodu over the past several years and for which separate directions have already been issued.”

The PCB has not acted upon the above direction of the SCMC and the company as usual proceeds unmindful of SCMC on the strength of their political and power influence

even in the Board. The Board member is very slow to act except in the cases where he has direct stake.

In the meanwhile LAEC detected unauthorized transportation and disposal of hazardous waste in 15 barrels in an open land in the nearby place by the company and caused to seize them all through the Sub Inspector of Police, Binanipuram on 27.08.2005. The LAEC on this incident made following recommendations:

1. "Cancel the authorization issued under Hazardous Waste (Management and Handling) Rules 1989 to the Merchem ltd Eloor forthwith as this unit has been found operating not only in breach of the said Rule but also the orders issued by the Hon'ble Supreme Court with impunity.
2. Impose fine based on the quantity of the hazardous waste not accounted by the company especially the tarry substance generated over these years.
3. The company should be allowed to restart its operation only after it account for the waste generated by it over these years especially the tarry substance which is calculated as **336 tonne** at the rate of **6 metric tone /day** production and on the payment of the fine imposed by the Board.
4. The board shall approach the **Central Pollution Control Board** giving a brief history and detailing the track record of the company along with the closure orders, show cause notices and other actions taken against the company over these years."

Dr.Claude Alvares , Honble Member of SCMC ,visited Kerala on 8.10.2005 .In his report , he issued certain directions to the PCB. The relevant directions relating to Merchem Reads thus:

- 1) "Merchem, a major problem unit, was visited to work out a practical arrangement to enable the local community and the LAEC, Kochi to do random inspection of the thodu (storm water drain) adjoining the plant. The unit agreed with the suggestion of the SCMC that a gate would be installed at the rear of the factory alongside the nallah for the purpose and the key to the gate would be handed over initially to the LAEC, Kochi and thereafter to the relevant ward member of the local panchayat. Merchem also agreed to clean up a one metre area all along the

thodu's banks so as to enable any person monitoring the nallah to move comfortably up and down the length of the entire water body.

The LAEC raised the issue of the hazardous waste that had been sourced to Merchem and which had been found dumped in a village outside the factory. The Board informed the Committee that proceedings were going on against the company under the HW Rules, 1989 as amended.

During the visit, I also had occasion to inspect a large hazardous waste dump behind the factory within its premises. We also found signs of dumping of hazardous waste outside the temporary secured landfill. The Board was directed to take samples and to submit the report to the SCMC.

I feel that owing to the continuous violations, this unit should be put under strict environment audit. This might best be carried out by a competent person like Dr.D.C. Sharma from CPCB Bangalore office. Dr. Sharma may please undertake investigation into:

- i) functioning of the R.O. and M.E.E. systems as there are serious complaints of bypass;
- ii) He may also inform the Committee on further actions to be taken to ensure that the pollution control systems installed are not by-passed. ”

The sample taken at the instance of Dr.Clude Alvaris from the Merchem premises got analyzed and the report vindicates the finding of Hazardous waste that is seen scattered all around around the premises. Lab report is extracted below:

**KERALA STATE POLLUTION CONTROL BOARD
CENTRAL LABORATORY GANDHI NAGAR**

Analysis Report –WATER/EFFLUENTS/ SOLID WASTE		No.1431	Date:31-10-05
Source	Merchem Pvt.Ltd Edayar	Sample received from	LAEC
Date of sample collection	8-10-05		
Ref.No.	LAEC/CL/05	Period of analysis	
Date of Receipt	10-10-05		
Scientists-in-charge of analysis			

Sl. No.	Determinant	Unit	Value			
			Sample No.			
			AQ54			
1	Zinc	mg/kg	1345.90			
2	Iron		29240			
3	Lead		180			
4	Cadmium		18.6			
5	Magnesium		486			
6	Hexavalent Chromium		13.2			
7	Total Chromium		227.60			
8	Manganese		328.6			
9	Titanium		BDL			
			Sludge near the Southern side of Temporory SLF(Merchem)			
Details of Samples :						
Remarks:						

The committee is deeply distressed over the inaction of the PCB in initiating effective and meaningful measures in terms of implementing various directions issued by the SCMC against Merchem Ltd, Eloor to abate the environmental damage.

The committee strongly feels that the present officers of the PCB overlooking the Merchem Ltd should be replaced by new officers from the Chief Office. LAEC find that the problem from the Merchem Ltd being one of environmental damage by the Hazardous waste, no compromise on the safety of the environment can be thought of. Further this unit being a chronic offender of environment laws, strict and stringent action bereft of any

leniency alone can bring result. The recent incidents of effluent discharge to Kuzhikandam thodu traceable to Merchem was brought to the notice of the Regional Office and the Chief Environmental Engineer Mr.Vijaya Bhas, the present officer Mr.K.K.Abdul Rahiman and the Environment Engineer Mr.Farooq Sait. They are fully aware of these recurring incidents. They have got these incidents enquired through Mr.Baburaj, Asst. Environment Engineer who has a track record of reporting matters orally(except in case superior officers want to book the culprit) had to report this time in writing .This may be because the people of the locality bounded him and got a copy of the report in writing on the spot itself on 07.12.2005. No action on that report is also seen taken. LAEC has been resisting itself to believe that the Board has lost its vigour and strength to act. It is therefore the right time to test its relevancy at least by belling the cat (Merchem Ltd.)

SCMC may issue orders for the following actions as a final opportunity to the company to perform and to the Board to prove its relevancy as a regulatory body to content pollution from this problem unit.

- 1) The chairman of the Board may assign special duty with all powers to such officers who have been effective to tackle problem units by their track record for Merchem Ltd, Eloor and the Chairman may directly supervise implementation of the directions.
- 2) The Member Secretary of the Board may be relieved from any duties in relation to Merchem Ltd. The Chairman, PCB may ensure issue of necessary order by the Board promptly brooking all delay.
- 3) Recall the two persons appointed by the PCB to monitor Merchem Ltd. These persons in the unit served no useful purpose except to give a shield and a cover up to the mischief of the unit.
- 4) As recommended by Dr.Sharma an environmental audit should be conducted exclusively for Merchem Ltd, Eloor for 2 months, which will include 24 hours monitoring into the production process, waste generation, the various outlets/nallas in the premises by involving LAEC.
- 5) LAEC may be directed to be involved to monitor the company for ensuring implementation of the following directions of SCMC including the direction to construct a footpath all along the Kuzhiakandam thodu, which suggestion has

been accepted by giving up the initial direction to construct a wall all along the thodu.

- a) To install a sealed meter inside the premises of Merchem Ltd., at the intake point of water from the Travancore Cochin Chemicals Ltd. (TCC) to ascertain the total quantity of water intake by Merchem.
 - b) At the point of process intake, a sealed water meter should be installed for ascertaining the total intake of water for process alone.
 - c) There should be a separate sealed electric meter exclusively for the operation of RO system and another one for the MEE system to ascertain the consumption of energy.
 - d) In the event of failure of RO system or the MEE, the Company must inform the PCB immediately and the reading of all meters should be intimated to the PCB.
 - e) The Unit must be directed to keep a schedule of back wash of sand filter and activated carbon filter.
 - f) The Unit must be directed to install flow meter with recorder in the feed lines and outflow lines of the RO and the MEE if these are not installed.
 - g) Over and above these suggestions, Dr. D.C. Sharma, , Zonal Officer of CPCB may be consulted for suitable suggestions to be insisted for the regulatory body to ensure that the RO system and the Evaporator System is actually put to use by the Unit.
- 6) To direct Merchem Ltd Eloor to execute a bank guarantee of Rs.10 lakhs forthwith.
 - 7) To combine all the drains in the premises of the Merchem and allow its discharge into Kuzhikandam thodu, outside the boundary of Merchem providing a delay pond visible to the public.

The committee after filing its report is sensing total non-cooperation from the officials of the PCB apparently on an excuse that after the submission of its report SCMC has assigned monitoring of only the project of Kuzhikandam thodu cleaning. LAEC's further inspection of the unit to ensure the implementation of the recommendation has not been given due importance and considerations. The continuance of LAEC seems to have disappointed the expectation of the Board and the companies that after the Environmental Audit report the committee will be wound up. The committee in the circumstance appeal to the SCMC that unless LAEC is empowered to monitor units for ensuring the implementation of the recommendations, what it achieved over the last one year period will be reversed as the companies have already showing the trend of going back to the old habits with no fear of interference by LAEC.

102nd meeting held on 29-12-2005, Thursday at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

The Convenor Mr. Farook said will furnish copies of letters addressed to the Merchem Ltd and all other communications made in relation to the directions issued by the SCMC from time to time. The copies of the letter so far addressed to the various companies will be made available to the LAEC by 3rd Jan.2006 to enable the Chairman to appraise the SCMC on the various actions taken by the Board and the measures adopted by the company in compliance of the said directions. LAEC also resolved to direct the Board to mark and forward one copy of each communication it address to the companies in Eloor Edayar relating to the pollution control measures, which will help LAEC in monitoring the unit and assessing its initiative to implement control measures.

It is reported to the committee that while the team consisting of LAEC member Mr. Asokan and PCB officials deputed to LAEC Mr. K.S. Soman, Asst. Environmental Engineer and Shanavas Asst. Scientist moving around the industrial belt at Edayar for inspection, got information from Asst. Environmental Engineer Mr. Baburaj that waste fat in solid form is discharged from Yeoman bone and Allied Products in river and that the team should join him for an inspection of this unit immediately as it is not safe for him alone to go to the unit for inspection. The team joined Mr. Baburaj immediately and proceeded to the said unit .The team found fat globules floating in the river. This unit is just adjacent to river Periyar. The team could trace two channels used for discharging the fat globules and the fat particles were seen in the riverbank. The team also could saw fat

particle floating in the down stream of the river. There is no other bone mill unit from where such fat particles can reach Periyar. The unit has undertaken before LAEC that it shall not discharge any effluent or any material into the environment either solid or liquid causing damage to the environment.

The committee has been observing the functioning of the bone mill units and recorded its appreciation for the improvement made by each unit. However the incident now detected in Yeomen bone and Allied Products has totally disappointed the committee. The committee takes strong exception to the conduct of the unit causing embarrassment to other Bone Mill Units. Taking note of the seriousness of the reversal of the improvement status achieved by the unit LAEC recommends to the Board that a Show-cause notice be issued to the unit to show cause why closure order should not be passed coupled with a penalty by way of fine.

LAEC recommended to the PCB to issue notice and consider their reply on its merit and take appropriate effective legal action including closure and other criminal prosecution against the unit if reply is unsatisfactory.

It is brought to the notice of the committee that the Irrigation Dept. is pumping river water to Edayattuchal on the pretext of giving irrigation to the near by Padashekaram. It is noticed that there has not been any agricultural operation in Edayattuchal for the last 2 years. Edayattuchal is one of the paddy fields rendered completely useless by the accumulation of industrial waste. The pumping of water to this Edayattuchal and flushing out the contaminated water back to the river pollutes the river as the water flushed out to river contains heavy quantity of hazardous waste. Contaminating river water is an illegal act prohibited by water Act. To ascertain the veracity of the report the committee decided to hold an inspection on 31st December, 2005 at 2.p.m.

The committee also resolved to engage a lady typist on job work arrangement to record the minutes of the meeting of LAEC and she would be paid wage not exceeding Rs.1500/- per month or such wage that may be fixed, whichever is less. Chairman, LAEC is authorized to engage the typist on daily wages or job wise as he may deem fit.

103rd meeting held on 2-1-2006, Monday at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

This emergency meeting is called to discuss the most disgusting incident noticed on the eve of New Year day, which turned the entire river Periyar in blood red, by the discharge of trade effluent from the Industrial area. The committee over the past one-year has studied the production and process of the 243 industries situated in Eloor-Edayar belt. An audit reports has been prepared and finalized. It was submitted to the SCMC. The committee during its inspection in Eloor Edayar area has found many units violating environmental loss by discharging trade effluent directly into the land, river and air. Action including closure with recommendations to adopt pollution control measures has been suggested to the PCB against the erring units.

The committee during its discussion could short list the company that can cause the river Periyar red by discharge of trade effluent. The short listed companies are CMRL, Binani Zinc Limited and Cochin Chemicals.

Cochin Chemicals is a unit of producing Aluminium Chloride, Ferrous Chloride, Enviro Floc as per the Performa invoice submitted by the unit. It is a small-scale unit. The waste generated from the unit cannot turn the whole river by one day even by discharging the entire quantity of effluent.

The other unit, which is capable to make river periyar red, is Binani Zinc Limited. The said company is under shut down for want of raw materials.

The only company now functioning, which is capable to make river red by its even one day trade effluent, is CMRL. The LAEC and the officials deputed to LAEC on inspection could find the valve at the outlet being tampered with and some work has been carried on. The place around the valve has been found wet.

River Periyar showed colour change from the early morning of 1st January 2006. The river virtually turned into blood red by about noon and by after noon the gravity of the colour subsided and became yellowish.

The CMRL is producing Synthetic Rutiles at an average of 71 MT per day. In the process waste Ferric Chloride and Ferrous Chloride containing metals such as, Zinc, Iron,

Lead, Cadmium, Copper, Nickel, Chromium, Manganese, with low pH is produced. Though the unit claims Ferrous Chloride as their by-products, this by-product were in fact by the nature of being waste Ferrous Chloride have very low demand and not profitable for trade, with the result the same had been discharged into the land and river Periyar until it was detected by LAEC. It was this discharge that made the river Periyar red in colour and incidents of large scale fish kills.

The colour of the effluent discharged by the unit at the outlet was seen bluish, green, or reddish. The change of colour from blue to green and then to red shows different stages of hydrolyses of iron from Ferrous to Ferric states in different pH ranges. The iron salts get hydrolyzed absorbing dissolved Oxygen from river water thereby depleting the dissolved Oxygen level in water. When the dissolved oxygen falls below 4Mg/Ltr, fish Kill is likely to occur. When the dissolved oxygen approaches or become zero, an anaerobic or septic condition sets in which aquatic life in water render impossible and causes formation of obnoxious gases.

LAEC caught this unit red handed while discharging trade effluent of green colour into river Periyar through its authorized outlet on 26-1-2005. The committee in fact had been on a look out to book this unit with concrete evidence for turning river Periyar into red. On detecting this illegal discharge, LAEC recommended closure of this unit in its resolution dated. 27-1-2005. The unit thereafter approached LAEC and gave an assurance that henceforth it will not discharge any untreated effluent into river and that in the event of any such incident being noticed in future, LAEC can enforce its recommendation for closure of the unit.

The unit has been claiming ever since that day that it is marketing its waste ferrous chloride. However it was reported to the committee that the ferrous chloride supplied from CMRL were found discharge into the catchment area at Wallayar in Palakkad District. On getting information Chairman LAEC, deputed Mr. Ashokan and Mr. Jacob V Lazar along with Mr. Shanavas, Assistant Scientist PCB to go to Wallayar and report to the committee about the reported incident. The members reported that the people in Wallayar seized three vehicles which carried the effluent on finding that the waste ferrous chloride carried in three tanker lorries were found discharged openly into the catchment area of Wallayar Dam. The transporter could discharge only the effluent of one tanker

lorry and the other two in the meanwhile were seized by the people. LAEC enquired with the PCB as to what action has been taken against the unit on this incident. PCB officials reported that their office at Palakkad is enquiring into the incident and the matter is being followed up.

The waste ferrous chloride which was once discharged directly into the river Periyar as a disposal mode has ever since its detection on 26-1-2005 have been transported to different destinations for disposal in open land or water. The claim of the unit that it is a by-product and they are trading this product is found to be false. It is worth noticing from the invoices drawn in respect of the sale of ferrous chloride that this so called product has been sold for Rs.10/- per Metric tone. It is incomprehensible to believe that this unit is trading this by-product for profit. The so called trade is a camouflage to cover up the transportation of untreated trade waste for disposal elsewhere after having found it impossible to discharge the same any more into river owing to the close monitoring by LAEC .

LAEC in an earlier occasion (that is on 8-10-2005) noticed colour change in Periyar indicating effluent discharge into river Periyar. That was when the Hon;ble member of SCMC Dr. Claude Alvaris was visiting Cochin for receiving the audit report of the LAEC. The report appeared in the press regarding the colour change in periyar did alert LAEC. It discussed the matter and as a safe guard against any such incident in future, it recommended to the PCB that the CMRL be directed to shift their legal outlet from river Periyar to a point where the pipe of legal outlet meet at Chakala thode and permit discharge at chakala thodu through an inspection chamber (for PCB to take samples of the discharge). It was further recommended that the pipe laid by the company beyond the said point directed to be dismantled. In compliance of the said recommendations, PCB issued directions to the CMRL to shift its outlet from river Priyar to chakala thode and dismantle the pipe laid beyond the said point. It is reported to the committee that though such a direction was issued by the PCB, (which is to ensure that no trade effluent is discharged directly to river Periyar), the unit has not complied with the said direction.

The committee enquired the source of discharge into river Periyar which turned the river red. The information gathered from the local residents and considering the aforementioned facts, the committee is of the unanimous opinion with exception of its

convener Mr. Farook Sait (who being the district in charge of the PCB reserves his finding for being officially to act upon) that the discharge which turned the river Periyar into red is from CMRL only and the tampering of valve at the Chakkala thode point by the company is a sufficient indication of their mischief. The tampering at the valve is to screen of the evidence left at the value by leakage of the discharged trade effluent.

In these circumstances, LAEC recommends immediate closure of this unit. The unit should be allowed to start operation only after it satisfy the Board that it has treatment facility to treat the total effluent generated during its main product and introduce such facility to remove the impurity in the ferrous chloride for trading them as a by product. The Board should take bank guarantee from the unit for future operation.

LAEC further recommends that the unit should not be allowed to transport waste ferrous chloride outside its premises under the cover of trading the by-product. The trade of waste ferrous chloride cannot be permitted .The company can trade Ferrous chloride without impurities.

The trade in waste Ferrous chloride can be permitted only by producing proof from industrial units claiming the said by-products as their raw material and disclosing total quantity of their monthly requirement. While permitting such trade, the Board should require the unit to produce the proof of delivery of the goods at the end point before allowing the next batch to go.

LAEC also resolved to make an enquiry into the trade of the by-product namely ferrous chloride over the past one-year to know the real nature of the transactions and the disposal of the trade effluent by the unit, which claimed to have purchased the effluent.

104th meeting held on 13-1-06 Monday at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

Chairman LAEC welcomed the Prof. Lakshmanan, Member, LAEC, Chennai who came for a visit to Kochi. Prof. P. Lakshman is dean of Loyola Institute of Business Administration, Chennai. He is also a lead auditor in Environmental Management System. Mr. Lakshmanan visited Kochi on the advice of Dr. Thyagarajan, Chairman, SCMC. Mr. Lakshmanan in his brief address to the committee complimented the work done by LAEC, Kochi and have noted his appreciation in the minutes book.

Chairman, LAEC briefed the committee about his visit to Bombay to attend the conference of the chairpersons and member secretaries of Pollution Control Boards and Local Area Environment Committees held on 5th & 6th January 2006. He informed the committee that after his power projection about the activities of Kochi LAEC, there was a lot of appreciation from SCMC and members representing other state boards in the conference. The work of the LAEC, Kochi was appreciated and the Chairman, SCMC Dr. Thyagarajan requested other LAECs to follow Kochi LAEC model. Dr. Thyagarajan invited comment from the Chairman of Kerala State Pollution Control Board on the work of Kochi LAEC. Chairman Mr. Rajmohan stated that he has high appreciation for all the work done by LAEC, Kochi and the Board is benefited its functioning and having regard to its success the Board is seriously considering to set up more similar committees in the state. Chairman, LAEC therefore appealed to the members to keep up the tempo and work hard to achieve the target of converting Eloor-Edayar Industrial belt a pollution free zone.

105th meeting held on 23-01-2006, Monday 4.30 pm at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

Resolution No: 1

The German Expert Dr. Jurgen Porst visited LAEC office on the invitation of Chairman LAEC. Chairman LAEC welcomed the guest and appraised the problems relating to the cleaning up of Kuzhikandam Thodu. Dr. Jurgen Porst shared his observations on Kuzhikandam Thodu which he visited in the morning along with the PCB Officers and LAEC Members Mr. Purushan Eloor and Mr. Asokan. He informed the committee that he visited Edayattuchal, Merchem, Eloor, HIL and Kuzhikandam Thodu. According to him contamination of the ground water would have spread all around the Kuzhikandam thodu and that the companies are yet to achieve zero discharge target despite their claim. Before deciding about the course of action on the cleaning process, he would like to examine the lab reports of various samples collected from Kuzhikandam Thodu, which is already with the board and LAEC and he would also like to take his own samples to reassure the result. On behalf of the LAEC committee Chairman, LAEC placed a cleaning up proposal as follows:

1. Before undertaking the cleaning up work, the companies should be asked to stop the discharge into Kuzhikandam Thodu and block intrusion of sea water by constructing a temporary bund.
2. Provide a big pipe all along the sides of the Thodu to carry water that may be discharged by the companies during the clean up process.
3. Divide Kuzhikandam Thodu into different compartments and draw the effluent from each compartment by using a sucker and treat the water so collected before the same is discharged. Allow the compartments to dry after sucking out the effluent from it. Thereafter remove the upper layer of the sludge from each compartment, which is dried in cake form, to the temporary storage facility offered by the Hindustan Insecticides Limited. Continue this process until the major solid wastes are removed from Kuzhikandam Thodu at a reasonable depth. By removing waste in dried form can reduce the spillage and odour nuisance.

The expert opined that the suggestion is feasible, but according to him the removal of solid in the said fashion will not help to remove the contamination of the under ground water. Contamination of ground water remedial is a long drawn process and very costly. The committee expressed the necessity to remove the sludge before monsoon, as during Monsoon, the Thodu get flooded making the life of the residents a hell. Expert assured early action in this matter at least by March end provided the Pollution Control Board move with all earnestness.

The committee decided to inspect the following units, which are identified as problem units and ensure that these units implement pollution control measures.

1. CMRL
2. Binani
3. Merchem – Eloor
4. Merchem - Edayar
5. Sreesakthi
6. Arjuna Natural Extracts
7. Nini Creepe Mill
8. Cochin Rubbers
9. Bone Meal Units
10. Cochin Chemicals
11. Cochin Leathers
12. Kairali Leather
13. T.M.S Leather
14. H I L

106th meeting held on 4-2-2006, Saturday 4.00 pm at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

Resolution No.1

It is reported that the Sub Inspector of Police, Fort Kochi has seized a tanker lorry carrying Ferrous Chloride brought for discharge. The Committee resolved to send a letter to the Sub Inspector of Police for a copy of the F.I.R. it is understood that the tanker lorry seized by the police belongs to M/s. Cochin Chemicals.

Chairman, LAEC Adv.P.K. Ibrahim directed Mr.Soman, Asst. Environment Engineer and Mr. Shanavas, Asst. Scientist to make the inspection report verifying the compliance of LAEC recommendations made in respect of each unit. Chairman instructed the committee members to note the improvements if any made by the units.

The Committee evaluated the post audit report developments and assignment of additional duties to Smt.Chithrakumari at Eloor Office of the Board. Chairman reminded all the members including the officers of the Board deputed to LAEC that Smt.Chithrakumari and other officers now deputed to LAEC are retained by the Board bearing in mind its recommendation that these officers should be entrusted with the duty at Eloor to ensure continuity of LAEC monitoring. The failure to bring about result by enforcing the recommendations will affect the credibility of LAEC and it may give a chance to the adversaries to blame LAEC for not achieving the desired result. In the circumstance the Committee resolved to request the officers deputed to LAEC to take maximum care and prompt action on all erring units that fail to follow suit.

It is reported that for want of sufficient representations from LAEC members many inspection scheduled could not be conducted. Chairman ruled that the inspections scheduled should be made even if only one member from the committee alone is present. The present inspections are only for ascertaining the improvements and compliance of the earlier recommendations of the committee. To insist the presence of more members makes no significance. However the Board officials deputed to LAEC must be present in all inspections.

The Committee raised its concern over the lack of fund at the office to meet the day-to-day expenditure. The chairman, LAEC reported that he has already taken up the matter with the Chairman, PCB and that he has assured sufficient fund by next week.

Chairman, LAEC Adv. P.K. Ibrahim briefed the committee about his meeting with the Hon'ble Minister for Environment Mr. Sujanal. Minister has assured all co-operations and he appreciated LAEC work. Hon'ble Minister had agreed to call a joint meeting of the LAEC, PCB officials, Local bodies and experts to discuss the problem in Eloor - Edayar and matter related to Periyar River. Minister has requested him to furnish the addresses of persons to be invited to such a meeting.

The committee considered the question regarding the renewal of consent. The committee resolved to request the PCB not to renew the consent mechanically. While considering the renewal application, recommendations of LAEC on each unit should be taken into account and ensure that the units have implemented the recommendations. If any unit is found lacking in pollution control measures, the consent should be refused stating the reason. A list of such companies which obtained consent / rejection should be maintained separately.

It is brought to the notice of the committee that certain steps are being taken for establishing new chemical industries. The committee in its report has recommended to declare Moratorium for chemical industries in Eloor-Edayar industrial belt. The concerned authorities should give due regard to this recommendation of the committee made in its audit report.

Committee resolved that the Surveillance Center now opened at Eloor industrial belt headed by Smt. Chithra Kumari, Environment Engineer is not made functional round the clock and there is no sufficient staff strength to man the office, no conveyance for inspections. The surveillance center therefore needs to be strengthened by all means with sufficient infrastructure.

To

The Sub Inspector of Police
Palluruthy.

Ref: Crime No. 33/2006

Sir,

LAEC is monitoring the industries in Eloor-Edayar area. Cochin Minerals and Retails Ltd; Edayar is a company under the monitoring of LAEC . It has come to our notice that the above referred crime has been in relation to discharge of Ferrous Chloride in a vehicle belongs to Cochin Chemicals believe to be lifted from CMRL Edayar. Kindly furnish a copy of the FIR as that is document required for conducting further investigation of submission of the report to the SCMC.

Thanking you,

Yours faithfully,

107th meeting held on 17.02.2006, Friday at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

The Committee deliberated on the issue of honouring industries who have complied by the pollution control measures. It was decided to short-list the companies, which have satisfactorily implemented pollution control measures and the units, which have further works to be completed need to be considered only later. Accordingly revising the list, the committee resolved to honour only the following 5 companies by conferring a letter of appreciation and a memento in a public meeting to be held on 26.02.2006.

1. SUD-CHEMIE INDIA PRIVATE LIMITED
2. TMS LEATHERS
3. RAMANAND ELECTROCOATS
4. NJAVALLIL LATEX PRIVATE LIMITED
5. COCHIN SURFACTANTS PRIVATE LIMITE

Chairman may contact the minister for environment as chief guest to the said meeting.

108th meeting held on 23.02.2006, Thursday at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

The Committee finalized the names of the following persons to invite for felicitation in the meeting arranged to honour the companies at Productivity Hall, Kalamassery on 26.02.2006.

1. Mr. Rajmohan, Chairman, PCB.
2. K.N.Gopinath, Joint Secretary, CITU.
3. K.C.Prabhakaran, AITUC
4. K.Amanulla, INTUC
5. N.K.Mohandas, BMS

The Committee also resolved to honour the officials of PCB deputed to LAEC in the said meeting with a certificate for their dedicated service and a memento.

109th meeting held on 10.03.2006, Friday at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

Resolution no: 1

The LAEC team on its inspection along with officials of the PCB including Smt.D.Chithrakumari on 9-3-2006 at Sri Shakthi Paper Mills , Eloor, Edayar found a drain being constructed in the adjacent land where the insulator of the unit is placed . The ETP of the unit is in another land. The rainwater from factory was directly dischargeable to the public drain situated on the side of the Unit. On being questioned about the construction of a new drain in the adjacent property, it was explained that the rain water from the factory premises will be carried through the underground pipe which is laid under the public road to that property and from their to river Periyar through the open drain now in construction. The rainwater was being discharged into the public drain all these years.

The unit is claiming zero discharge. It has no affluent for discharge. However the unit in the earlier 2 occasions were found discharging trade effluent into its open land .On being assured that no such illegal discharge will be repeated ,the committee resolved not to recommend closure for illegal discharge .

The unit is now going for expansion. LAEC 's request for the new ETP drawing to assess its efficiency to tackle the treatment of effluent ,has not been responded positively ,despite their promise to make available the drawings. The unit assured repeatedly that details would be made available to the office. That has not been done so far.

It is strange to notice that the unit has not been keeping any relevant documents in the office at the unit for verification during the inspections. Whenever any documentary details are sought for verification the reply was that no documents are kept in the unit and all are in the Head Office at Ernakulam. This evasive answer is found to be a tactics resorted by the unit who are not required to make available the papers to the inspecting team of the regulatory body. This practice is illegal and cannot be allowed. The committee take strong exception of this conduct of the unit and disapprove the practice,. The Board should direct the unit to keep all the relevant documents such as consents, authorization, sketch, plain etc; relating to the unit in the unit itself for verification.

The new drain that is being constructed by the unit is suspected to be for the use of clandestine discharge of untreated effluent directly into the Periyar under the pretext of rain water discharge. The earlier discharge of trade effluent into the public drain was detected by the local public, which compelled the unit to go for zero discharge. However the zero discharge is only a claim, which is yet to be proved efficient.

The drain constructed by the unit is without the approval and consent of the board. It is an illegal activity prohibited by law. The unit requires no new drain for discharging rain water, as it could be easily discharge to the public drain, which is close by the unit. The water need not be carried all along a distance of 50 mts. for discharged into river periyar when the same can be done within a distance of 50 mtrs. The board may inspect the unit and issue appropriate directions to dismantle the drain, as that would be a threat to the Periyar .

The committee discussed the constitution of a Local Environment Surveillance Committee as measure to keep a watch on industries after the post LAEC period. The names of the following persons have been finalized for recommending to constitute LESC in terms of paragraph 55 and 56 of the Supreme Court order dated 14-10-2003.

Chairman Adv P.K.Ibrahim reported to the committee about the action he has taken on receiving intimation regarding the seizure of waste oil by the Alwaye Police. He addressed a letter to the S.I of Police with copy marked to Pollution Control Board and SCMC. Dr. Claude Alvaris sought details about the incident. A copy of the FIR will be forwarded to him.

Chairman reported to the committee that Dr. Claude Alvaris has been invited to receive the final report on the impact assessment under taken by of the LAEC .The report will be submitted by the end of this month and a date convenient to Dr.Claude Alvaris be sought.

The meeting concluded at 8.00 pm.

110th meeting held on 17.03.2006, Friday at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

The committee expressed its anxiety over the recurring complaints of colour change in Kuzhikandom thodu and Periyar .The surveillance of the units are not effective.The committee resolved to recommend that there should be regular inspections to identify the culprits and collection of samples especially from areas where complaints are regular. A visit book should be maintained .

Committee also sought report from Board on the actions taken for providing drinking water to the effected peoples of Eloor.

The committee resolved to conduct a seminar cum workshop on 25-3-06 on the subject “environment pollution in Eloor Edayr – problems and remedies”.

111th meeting held on 24.03.2006, Friday at Local Area Environmental Committee Office, Kaloor Towers, Kaloor.

The committee finalized the Environmental Impact Aseessment report. The committee place it on record the efforts taken by the Board officials deputed to LAEC in assisting the committee to prepare the impact assessment report which is really a work that require expertise. The pollution control officials namely Mr.K.S.Soman Assistant Environmental Engineer and Mr.K.V.Shanavas Assistant Scientist under the supervision of Smt.ChithraKumatri, Environmental Engineer have contributed their expertise and was of great use in accomplishing the task. The committee place it on record their service with gratitude. The Board Officials in the Central lab at Ernakulam region have as usual extended their service to complete the sample analysis in record time and the committee record its appreciation for them also.

**THE REPORTS OF THE SUPREME COURT MONITORING COMMITTEE ON
KERALA VISIT**

KERALA VISIT REPORT

From Dr Claude Alvares

The undersigned member visited Kerala, specifically Kochi, on 8th October 2005. The visit, which was to receive the Environment Audit Report prepared by the LAEC, Eloor-Edayar, Kochi, concerning 247 industries in the Eloor/Edayar industrial belt, was approved by the Chairman. Other members of the Sub Committee were informed of the visit and invited to attend. Dr Boralkar indicated he could not attend.

The formal ceremony of handing over the report was presided over by Shri.K.K.Ramachandran Master, Health Minister, Kerala Government. Also present were former Supreme Court Justice, V.R. Krishna Iyer, both the Chairman and Member Secretary of the Kerala Pollution Control Board, Chairman and members of LAEC, Eloor-Edayar Kochi.

Copies of the Environment Audit Report are being dispatched individually to all members of the Supreme Court Monitoring Committee from Kochi. It is important at this stage to brief the SCMC on the LAEC's work.

The LAEC is a unique committee that comprises persons from industries, Pollution Control Board and NGOs. The LAEC Kochi was set up after the first visit of the SCMC to Kerala. (The visit team was headed by Dr. Thyagarajan.) Due to lack of pollution control measures, the River Periyar was found to be biologically dead when the SCMC visited. As the SCMC was seriously concerned, the LAEC was appointed and directed to generate a comprehensive report of the effectiveness of pollution control measures in each of the 247 industries. This would not only give the SCMC a clear picture of the actual situation in terms of the management of hazardous wastes (now dumped in the river) but also enable the SCMC and Kerala Board to allocate the fine of Rs.2.5 crores imposed collectively on the 247 industries based on 'Polluter Pays' principle for destruction of the Periyar ecosystem for over a decade.

For the purpose of its assigned work, the LAEC conducted site visits to each and every industrial unit in the area and conducted over 92 meetings and a public hearing. The LAEC also conducted several surprise night raids. It involved the Cochin University, the

Kerala Central Laboratory and the Fisheries Institute, Kochi, in its work. It held exhibitions and meetings to gain a wide consensus on halting the pollution of the Periyar within the city of Kochi.

The final report now completed is an exemplary document for which there is no present parallel. The SCMC should consider the report seriously so that the labours of the local committee are not in vain.

Once it is decided how the fine of Rs.2.5 crores is to be allocated, the Kerala Board will file the appropriate application under Section 16 (3) of the Hazardous Wastes Rules to the Central Pollution Control Board and the matter will follow its own course.

I thanked the LAEC warmly for its work on behalf of the SCMC. Its work is now over, except for the rehabilitation of the Kuzikandan Thodu, which has been placed under its supervision.

During the visit I also took the opportunity to get a compliance report from the Kerala Board in respect of the items listed below (flowing from earlier visits of the Sub Committee):

1) TTP, Trivandrum: The Board informed the Committee that the TTP had paid up the bank guarantee of Rs.5 crores, as directed by the SCMC, but this had been done only in the month of September. Earlier, the Board had written to the Committee that the unit did not appear to be serious about carrying out the directions given by the SCMC to prevent it from going for closure.

The Board was directed to send the SCMC a detailed report on compliance to the actions required to be carried out by October 31st by TTP in order to enable the SCMC to issue the necessary directions.

2) Kochi Port: I was informed by members of the LAEC Kochi that two consignments of hazardous waste had reached Cochin Port from foreign countries. Consignments of waste plastic and of transformer oil were received by the port from New York and Japan respectively. The Committee was informed that the transformer oil had already been dispatched back to the country of origin and the same action was contemplated with respect to the waste plastic.

The Board was directed to submit a report to the SCMC within a week, providing details on the two consignments and of the actions taken. The report is to be done in association with the officials from Customs and the Kochi Port Trust.

3) Merchem, a major problem unit, was visited to work out a practical arrangement to enable the local community and the LAEC, Kochi to do random inspection of the thodu (storm water drain) adjoining the plant. The unit agreed with the suggestion of the SCMC that a gate would be installed at the rear of the factory alongside the nallah for the purpose and the key to the gate would be handed over initially to the LAEC, Kochi and thereafter to the relevant ward member of the local panchayat. Merchem also agreed to clean up a one metre area all along the thodu's banks so as to enable any person monitoring the nallah to move comfortably up and down the length of the entire water body.

The LAEC raised the issue of the hazardous waste that had been sourced to Merchem and which had been found dumped in a village outside the factory. The Board informed the Committee that proceedings were going on against the company under the HW Rules, 1989 as amended.

During the visit, I also had occasion to inspect a large hazardous waste dump behind the factory within its premises. We also found signs of dumping of hazardous waste outside the temporary secured landfill. The Board was directed to take samples and to submit the report to the SCMC.

I feel that owing to the continuous violations, this unit should be put under strict environment audit. This might best be carried out by a competent person like Dr.D.C. Sharma from CPCB Bangalore office. Dr. Sharma may please undertake investigation into:

- i) functioning of the R.O. and M.E.E. systems as there are serious complaints of bypass;

- ii) He may also inform the Committee on further actions to be taken to ensure that the pollution control systems installed are not by-passed.

4) TSDF, Kochi: The Board informed the Committee that the land for the TSDF has finally been handed over by FACT to the agency (Kerala Enviro Infrastructure Ltd) which has been asked to expedite the construction. The DPR was produced by FEDO in February 2005. The EIA Report was prepared in March 2005. PH is completed and the site approved. All these actions are due to pressures exerted by the SCMC.

From information received, it does not appear however that the TSDF will be ready shortly. The date given by the Chief Minister of Kerala was 31st March 2005, which has already expired. The State of Kerala at present is found in violation of the Supreme Court order dated 14.10.2003 in this respect. The Kerala Board is therefore directed to ask the agency to provide a time bound statement/bar chart to the SCMC, setting down the schedule of construction and operation of the TSDF. The statement should include details of construction of temporary storage facility so that the hazardous wastes generated by different units (and presently stored in their premises), can be relocated to the site and appropriately managed.

5) CETP: The Committee was met by officials of the Small Scale Industries Association. The Association agreed that they would take up the construction of the CETP project which would ensure zero pollution of Periyar. Feasibility Report prepared by Envirochem Laboratories, Thrissur, was handed over to the Committee. Action would commence within the month. To save time, they may consider whether the work could be carried out by their own association in place of creating an additional agency for the purpose. The Kerala Board agreed to ensure that all units are made members of the present Association as part of the strategy for 100% effective pollution control.

- 6) The Committee was informed that the seven bone meal units faced with closure as of August 31st had all improved their production facilities, created separate areas for workers and taken measures to eliminate the odour problem emanating from their units.

7) The directives of the SCMC to the Kerala Government for strengthening of the Board were, as per information received, discussed at a high level meeting comprising the Chief Secretary, Finance Secretary and Kerala Board and it was decided to accept the directions for approximately 122 posts (vacant entry level posts and posts now filled on deputation). However, the decision on additional posts required would only be taken after adequate resources have been generated by the Board. The Board informed the Committee in this connection that it had already decided to revise the consent fees and also levy charges for analysis, which would enhance the revenue of the Board by a couple of crores and put it in a far more comfortable position than it is now. At that stage, it will return to seek the concurrence of Government to implement the remaining directions of the SCMC on this issue. The SCMC may decide whether this is adequate compliance. The Kerala Board chairman has assured the Committee that the 122 posts currently approved will be adequate for a complete revamp of the Board and its efficiency.

8) Thodu Rehabilitation Project: The Board has submitted a letter seeking relaxation of time for implementation of the Thodu project. The Chairman, SCMC, has approved the relaxation considering the circumstances provided in the application. The Board agreed to the suggestion of the Committee that it approach UNIDO for assistance in the rehabilitation project. The Board informed the Committee that the District Collector would have to be involved in the rehabilitation project as the area of contamination transgressed the jurisdiction of several authorities (the canal being approx. 2.7 kms long).

9) The Board agreed to the suggestion of the Committee that it would consider ways of making the institution of the LAEC more permanent since the idea has worked very well. The Committee suggests that future arrangements could be in terms of the terminology used in para 55 of the order of the Supreme Court dated 14.10.2003. The nomenclature could be along the lines of an 'Environment Surveillance Squad'. However, the Committee would not like to restrict the imagination of the Board in any manner on this issue but looks forward to positive proposals in this regard.

Dr Claude Alvares
SCMC Sub Committee Kerala (Coordinator)

River Periyar - Revival and Restoration Plan - A Plan for discussion

By R.Sreedhar,Thanal

I. Prelude

1. The Supreme Court Monitoring Committee on Hazardous Waste has ordered the revival of the river Periyar on a war footing and has allotted time till December 31st 2005 for its implementation.
2. The Committee has also directed that the fine levied on the industries for polluting the river could be used for establishing such a system.
3. In this circumstance it is suggested that we approach the matter in its short term actions needed as well as a long term and sustainable plan needed for the revival, restoration and maintenance of the river in its quality.

II. Pre -conditions

1. Zero effluent discharge and Zero solid waste dumping from the industries in the Eloor-edayar area as well as other places in the river Periyar. This includes all wetlands and drains flowing into the river.
2. Establishment of a Periyar Revival and Protection fund with active support of the industries in the area.
3. Establishment of an independent river monitoring and protection centre at Eloor with active participation of various stake holders and community participation and under the auspices of the LAEC.
4. An active working MoA with the KSPCB to support the activities of the Periyar River Monitoring and Protection Centre with powers of mandatory nature for the KSPCB to take action based on the recommendations of the Local Area Environmental Committee (LAEC).

III. Research - Assessment / Survey / Literature study

1. A detailed base line study based on literature and using survey and other assessment methods of all related parameters of the river
2. Valuation of eco-system goods and services and the cost of degradation
3. Quality of the river ecosystem – physical, chemical, biological, geological etc
4. Chemical contamination assessment

5. Survey of river basin to find sewage outlet points and to assess the needs of local panchayaths to stop contaminating the river.
6. Survey of river basin to find vegetative growth on the river banks and to assess the needs of the panchayath to develop natural support of the river bank.
7. Basin-wide assessment of sediments and within priority subbasins, intensive sediment surveys
8. Assessment of submersed aquatic vegetation (SAVs)
9. Consistent monitoring of ambient water quality
10. Development of water quality models, agriculture water use assessments,
11. Different water allocation mechanisms and their impact on agriculture, water productivity and food production
12. Strengthening of data base on various river and water parameters and habitat parameters (see action plan of Dr Madhusoodhanakurup)
13. Socio-economic study and impact assessment – with special emphasis on the loss to livelihood, health, food base, plant diversity, etc
14. Follow up studies on all the above matters

A detailed plans (draft proposals) for assessment and revival are submitted as annexures by Dr N Chandramohankumar and Dr Madhusoodhanakurup

IV Restoration and Revival

1. Restoration of fish habitat, ecosystem and fisheries of downstream part of the Periyar river (see action plan of Dr Madhusoodhanakurup)
2. Restoration of livelihood (agriculture and fisheries) and the culture dependent on the river resources
3. Socio-economic restoration of the surrounding community (health, livelihood, right to peaceful enjoyment of the environment and the resources)
4. Conducting awareness workshops and public programmes (exhibitions, street corner meetings etc) for building awareness among the public regarding industrial safety and precautionary measures
5. Conducting workshops – Technical workshops to assist industries shift to clean production, zero discharge, eco-friendly products manufacturing, processes etc
6. Conducting workshops – Industry-Community interaction on local environment. Social and common platform issues

7. Developing and Implementing a community-response based certification system –
Local Environmental Compliance Certification
8. Afforestation Programmes - The Catchment areas of the river Periyar needs afforestation planned scientifically so as to maintain the summer flow in the river and also to increase the flow rate through out the year. Trees and riverine vegetation also needs to be increased with afforestation programmes along side the river bank through out the river stretch. Stone wall banks should be avoided and replaced with natural vegetation on the banks. Awareness drives should be done along the panchayaths on the banks of the river to this effect.
9. Pollution Prevention - From Local bodies
 - Closing of all sewage canals leading to the river
 - Effective banning of direct waste dumping into the river, with offence punishable
 - Instruction boards and awareness programmes
 - No farming to be allowed inside the river and on banks close to the river
 - Preventing the use of chemical fertilizers and pesticides in the catchment areas of the river
 - Preventing establishment of waste producing activities on the banks of the river – industries, slaughter houses, markets, transport and automobile centres etc
 - Preventing brick making and brick choolas on the river banks
10. Pollution Prevention - From Industrial Installations
 - Industries to have a time-based plan to shift to zero-discharge systems of production
 - All unauthorized effluent outlets to be closed immediately
 - All authorized effluent outlets to be marked with display boards and real time monitoring of quality and quantity to be established, till zero discharge is established
 - To phase out industries that do not or cannot have a zero-discharge plan in a reasonable time frame.
 - Stopping of all solid waste disposal in the river and also on the land which could flow indirectly into the river or contaminate the ground water
11. Establishing bathing ghats / fishing ghats in the river

V Monitoring

1. Establishment of an independent **Periyar River Monitoring and Protection Centre (PRMPC)** at Eloor running autonomously under the auspices of the LAEC and assisted by the KSPCB and the CUSAT. Community River Monitors, volunteering from the community (about 7 members from environmental, fisherfolks, farming community and including women) to be trained by the CUSAT and the KSPCB in monitoring, restoration work and also specific action for remediation and disaster management.
2. The PRMPC may be setup at the 11.5 cents of land allotted to the KSPCB near the Ferry. The Periyar Revival Plan should be implemented under the auspices of the LAEC (for the sake of effective and fast implementation). The Periyar Revival Plan must be connected to the PRMPC.
3. The PRMPC should have adequate facilities for fast response and also for monitoring. It activities whenever necessary should be supported by the KSPCB and the CUSAT.
4. The PRMPC should be entrusted with periodical monitoring and documentation as well as publishing of the data – and the KSPCB should continue their routine monitoring activities, but with avoiding redundancy and should work in tandem with the PRMPC.

VI Documentation, Information Sharing and Public Consultation

1. The PRMPC should act as a well-documented centre for the matters pertaining to intake, outlet and water quality and flow of the river water. It should also be a centre researching and maintaining latest information on matters of industries and pollution prevention, as well as standards and global matters.
2. A daily catalogue to be made available as a public document should be done of the outlets, intake and discharge.
3. Periodical data collected of water quality, and other indices should be made public using display boards.
4. Maintain a website where information and work undertaken by the PRMPC as well as the KSPCB and other agencies working in the programme is published periodically
5. A small reference library be developed.

6. Develop and implement out-reach programmes and public consultation as well as hearing programmes

VII Financial

1. The financial source for the plan is expected from the industries in the Eloor-Edayar area. It is suggested that the Rs. 2.5 crore to be collected is earmarked as a starter fund, and then every year a small percentage of the turn-over of the industries be paid to the centre for establishment and running of the revival and protection system.
2. The plan should also try to raise some support from GoI, CPCB, other independent funds etc
3. Restoration packages such as this could also receive support from the global community through UNEP. The cleanup of the Kuzhikandom Thodu polluted by the pesticide industry HIL and also by Merchem should be included in the national Implementation Plan (NIP) of the Stockholm Convention on Persistent Organic Pollutants (POPs) which is supported by the GEF.

VIII Infrastructure

1. An aesthetic utilitarian eco-friendly building (with the help of Habitat or Costford) to be established at the land available near the Ferry for the operations of the PRMPC (to be under LAEC).
2. A small boat with an outboard engine for sample collection as well as river monitoring and response
3. Adequate lab facilities for first level monitoring and analysis
4. Minimal office equipments, stationeries and a computer
5. 1 Clerical person
6. 2 cycles for the Community River Monitors

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