

THE INDIAN PEOPLE'S TRIBUNAL REPORT

On Human Rights Violations, Industrial Pollution and the Implications of the
Proposed Chemplast Sanmar PVC Factory in SIPCOT, Cuddalore, T.N

Tribunal Headed By:
Justice J Kanakaraj
(Retd. Judge, Madras High Court)

Members:
Dr. Amit Nair
Dr Kannabiran
Prof. V Vasanthi Devi

INDIAN PEOPLE'S TRIBUNAL ON ENVIRONMENT AND HUMAN RIGHTS

JULY 2003

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Justice J Kanakaraj

Born in 1936 at Maravanmadam near Tuticorin, he obtained an M.A. in Mathematics and B.L. degree. He enrolled as an advocate in the year 1959 and practiced in the Madras High Court. In 1989, he was appointed Additional Government Pleader. He went on to become a Judge at the High Court bench in March 1990. After retirement, he was appointed Chairman of Sales Tax Special Tribunal for three years. Currently he is the Chairman of the Advisory Board and also acts as Arbitrator in many cases.

Members:

Dr Amit Nair

Dr Amit Nair holds a doctoral degree from University of Delhi and is currently a Director in Development Alliance Pvt. Ltd. He has extensive research and teaching experience in the field of environmental health, pollution and control. He is also actively involved in environmental and health management projects, especially in environmental health impact assessment and monitoring studies, research studies on trophic transfer (movement of chemicals within the food chain). He has been involved in conducting impact assessment of chemical factories around human settlements. These include Union Carbide India Limited, Bhopal, and Hindustan Lever's Thermometer Factory at Kodaikanal.

He has provided his services to international research organizations such as DFID India, World Bank, International Atomic Energy Agency (IAEA), Austria, HiVOs, Netherlands, Multi-Resource Centre, USA, Japanese Bank for International Corporation (JBIC) and University Grants Commission (UGC).

Dr. V. Vasanthi Devi

Dr Vasanthi Devi retired as the Vice Chancellor of Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu. She was also a member of Tamil Nadu State Planning Commission, Chairperson and Member of various committees of University Grants Commission. She has been part of people's Organisations like ' Penn ', a Centre for Women's Studies, Movement for Women's Awakening, Women's Progressive Association, Women's Action Forum for Communal Harmony and Citizens for a Secular Society in various capacities.

She was a Member of Expert Committee constituted to study the Impact on Coastal Ecology and Coastal Communities caused by Ennore Satellite Port, North Chennai Thermal Power Station and the proposed Petrochemical Park. Her areas of interest are Human Rights, Gender, Gender Studies, School and Higher Education, Community, Building, Environment, and Peoples' Movements.

Currently she is the Chairperson, Tamil Nadu State Commission for Women.

Dr Kannabiran

Dr. Kannabiran is a medical doctor and served as the Health Officer for the Madras Municipal Corporation.

CONTENTS

PART I: BACKGROUND	1
Cuddalore - A Background	1
SIPCOT Industrial complex	2
IPT in Cuddalore	3
Terms of Reference	3
The Public Hearing	4
PART II: HUMAN RIGHTS VIOLATIONS AND ENVIRONMENTAL POLLUTION IN CUDDALORE	6
Unplanned Industrialisation	6
The Legal Framework	6
Toxic Effluents Disposal	8
Common Effluent Treatment Plant	10
Groundwater Situation	11
Declining Water Tables	12
Salinity Intrusion	12
Groundwater Pollution	13
River Water Quality	15
Illegal Units: Condoning Pollution	17
Impacts of Industrialisation on Agriculture and Farmers	20
Impacts of Industrialisation on Fisherfolk	22
Impacts of Industrialisation on Health and Well-being	23
Employment and Working Conditions	26
PART III: PROPOSAL FOR AN IFC-FUNDED PVC FACTORY BY SANMAR CHEMPLAST LTD.	29
Local Sentiment	30
The Case against PVC	30
PVC - What we know is bad news	32
A Critique of Chemplast's PVC project and its Rationale	33
Violation of IFC Requirements	34
PART IV: OBSERVATIONS OF PANELLISTS	37
PART V: FINDINGS AND RECOMMENDATIONS	40
PART VI: ANNEXURES	43
ANNEX I: Evaluation of Environmental & Social Impact Assessment Report for the Proposed PVC Project at Cuddalore, Tamil Nadu (Prepared by: Mark Chernaik, Ph.D. Staff Scientist Environmental Law Alliance Worldwide, U.S).	43
ANNEX II: Existing Restrictions on the Use of PVC	49

LIST OF ABBREVIATIONS

ADB	- Asian Development Bank
BOD	- biological oxygen demand
CETP	- Centralised Effluent Treatment Plant
COD	- chemical oxygen demand
CRZ	- Coastal Regulation Zone
CUSECS	- Cuddalore SIPCOT Industries Common Utilities Ltd
DEE	- District Environmental Engineer
DMK	- Dravida Munnetra Kazhagam
DO	- Dissolved Oxygen
EDC	- ethylene dichloride
EIA	- Environment Impact Assessment
EIS	- Environmental Impact Statement
FEDCOT	- Federation of Consumer organisations of Tamil Nadu
IFC	- International Finance Corporation
IPT	- Indian People's Tribunal on Environment on Human Rights and Law
NABARD	- National Bank for Agriculture and Rural Development
NEERI	- National Environmental engineering research institute
POPs	- Persistent Organic Pollutants
PVC	- Poly-Vinyl Chloride
SIPCOT	- Small Industries Promotion Corporation of Tamil Nadu
TNPCB	- Tamil Nadu Pollution Control Board
USEPA	- United States Environment Protection Agency
VCM	- Vinyl chloride monomer
VOC	- Volatile Organic Compounds

BACKGROUND

Cuddalore - A Background

Cuddalore is in the heartland of Tamil Nadu, located 200 km south of Chennai, and less than 25 km south of Pondicherry. It is a port town from ancient times with historical trade ties to the Occident and Orient. The 27 sq. km district comprises 6 taluks and 136 Panchayati villages. Both groundwater and surface water are abundantly available in the region thanks to the efficient network of tanks (eris), rivers and the perennial tidal rivers that are fed by streams and tank overflows.

Agriculture is the mainstay of the district and is dependent on availability of quality sub-surface water harvested through tubewells and borewells. The primary crops are paddy, sugarcane, groundnut, gingelly (sesame oilseeds), coconut and millets (kambu, varagu); pulses like red, green and black gram; and fruits like bananas, cashew, mango and jackfruits.

The 2001 data from the Census of India lists more than 80 percent of the "total workers" in rural Cuddalore as "cultivators" (24 percent) and "agricultural labour" (57 percent). The area where State Industries Promotion Corporation of Tamil Nadu (SIPCOT) is currently set up was fertile agricultural land that supported 2-3 harvests a year.

Given its proximity to the sea and the numerous estuaries and rivers running through the area, fishing too is an important activity. Marine fishing, the more lucrative trade, is exclusively practiced by those living on the coast. Inland fishing -- particularly in the River Uppanar on the banks of which SIPCOT has set up -- forms the sole livelihood activity for several villages of inland fisherfolk. Of late, dalits have taken to fishing or fish gathering. The dalits either use hook and lines or hand-gather bottom-dwellers and shellfish, while the fisherfolk use hand-cast nets. A few members of the Padaiyachi Vanniar community also fish using stake nets.

Natural resource-based cottage industries too thrive in the Cuddalore district with households engaged in making ropes, weaving baskets and other products with coir, coconut and palm thatch, bamboo and reed.

However, barring fishing in the Uppanar, virtually no other natural resource-based activity exists in any significant scale in the villages abutting or within the SIPCOT Industrial Complex. Also, with no means of livelihood, and limited but hazardous jobs in the factories, the villages in and around SIPCOT have become severely impoverished.

The communities in this area are very strongly delineated on caste basis. The few Dalit communities living inside the SIPCOT region are mostly employed as contract labour in the industries and usually perform the most hazardous tasks. This is evident from the fact that

Dalit contract labourers are usually the ones who are victims of occupational hazards such as leaks, spills and explosions. The other communities include land-owning Vanniars and Chettiars, marginal landowners and landless Vanniars, inland fisherfolk (Sembadavar), marine fisherfolk, and traders and contractors some of whom are Nadars. Caste differences and conflicts have contributed considerably to the lack of unity among villagers in addressing the environmental problems.

The caste issue has been successfully used to create rifts within the community. Also, an uneasy tension exists at best of times between the Dalits and the caste Hindus in the region although both come from extremely impoverished backgrounds and suffer at the hands of the same industries, albeit in different capacities. Factory owners have used the jobs v. environment card successfully in pitching the workers against the community.

SIPCOT Industrial Complex

State Industries Promotion Corporation of Tamilnadu (SIPCOT) Chemical Industrial Estate is located 8 km from Cuddalore on the seaward side of the Cuddalore-Chidambaram Road, stretching from Pachaiyankuppam in the North to Semmankuppam in the South. The Industrial Estate was set up in 1982. Phase I of the industrial complex spreads over 200 hectares (519 acres) and is set up to house 53 units. Phase II will cover 88 hectares (200 acres).

The plots are priced at Rs. 14 lakhs per acre. Financial incentives to entrepreneurs include a cash subsidy at 15 percent of fixed assets with a maximum limit of Rs. 15 lakhs. SIPCOT also provides a separate substation for uninterrupted electrical power, and water to the industries in the complex.¹

Currently, between 26 and 29 functional units lie within Phase I of the industrial estate on the western bank of the River Uppanar. Different government documents provide different numbers of operational units. A few companies such as Rallis, EID Parry, Elf Atofina, Vanavil Dyes and Bayer operate outside the SIPCOT limits but in the vicinity of the Estate. These companies manufacture pesticides and intermediates, pharmaceuticals and intermediates, chemicals, plastics and plastic additives, dyes and intermediates and textiles. [List attached] Less than 4 units in the region are categorised as non-polluting, while 24 companies fall under "Red" category of highly polluting industries.² Seven out of nine industries proposed for SIPCOT are "Red" category industries.³

Ironically, after identifying the SIPCOT as an estate for chemical and hazardous industries, the State Government has allowed chemical companies - such as Bayer Sanmar and Atofina Peroxides - to set up outside the industrial estate.

¹ www.tidco.com/tn_policies/industrial_parks/cuddalore_industrial_park.asp

² Source: NEERI, Nagpur 1999. Subsoil Water Quality Assessment in and around the SIPCOT Industrial Complex, Kudikadu Village, Cuddalore Page 9.]

³ Letter DE/TNPCB/CUD/F.3632/2002, dated 22-08.2003, Er. Palaniswamy, Dist. Env. Eng. TNPCB.

Several villages, including Pachaiyankuppam, Thaikal, Thiyagavelli, Eacchangadu, Kudikadu, Karaikadu, Sonnanchavadi, Sangolikuppam, Nellikuppam, Poondiyankuppam lie within or in the vicinity of the industrial complex.

IPT in Cuddalore

The SIPCOT chemical industrial estate in Cuddalore, Tamil Nadu, is notorious for its pollution. Communities living in and around the industrial estate complain that their lands have been taken forcibly, often without adequate compensation, and that the pollution from the industries has damaged their environment, livelihoods and health. According to villagers, the multipronged attack on their life-support systems by chemical industries has impoverished them. However, Government agencies, including the TNPCB and the District Collectorate, have ignored their sufferings, and in instances even shielded the polluters.

Industries, however, contend that they have taken adequate measures to control pollution, and that the situation is not as dire as is pointed out. More importantly, they say, the industries are a significant contributor to the overall revenues of the state and to the economic well being of the Cuddalore villages.

Industries' claims notwithstanding, Cuddalore's pollution and the related human rights violations have already attracted the attention of the State Human Rights Commission. In a 1998 report of its findings, the Commission observed that "public health [in SIPCOT] cannot take more burden than that which already has ensued by the existing chemical industries." The report recommends an end to the setting up of new chemical industries in the region.

In early 2002, villagers in Cuddalore learnt about a new proposal by Chemplast Sanmar to set up a factory to manufacture Poly Vinyl Chloride (PVC) plastic.

Faced with the threat of adding to the already unbearable pollution, a number of public interest groups including Cuddalore-based FEDCOT, Pasumai Thaayagam, Toxics Link and CorpWatch approached the Indian People's Tribunal to investigate the problem.

Terms of Reference

The Tribunal hearings were conducted on two related subjects with the below objectives:

I. Environmental and Human Rights Violations in Cuddalore

- Assess ongoing human rights violations in Cuddalore SIPCOT by chemical industries;
- Assess adequacy of existing regulatory mechanisms to check pollution-related human rights violations;
- Assess damage to livelihood, water security, health and future generations by existing chemical industries;
- Recommend relief measures for pollution-impacted communities, including measures for livelihood, water, health and well being of future generations.

II. Proposal for an IFC-funded PVC factory by Sanmar Chemplast

- Assess the merits/demerits of PVC in the light of international, national and local

- level awareness of PVC and its pros and cons;
- Assess the Sanmar Chemplast proposal, and the International Finance Corporation's Role in promoting PVC;
 - i. Is the Environment Impact Statement complete and truthful?
 - ii. What is the pollution/hazard potential of the factory?
 - iii. Availability of alternatives to PVC
 - iv. The opinion of the local community
 - v. IFC's response to community objections to PVC factory vis-à-vis their internal guidelines, and social and environmental obligations.
 - vi. Violation of IFC's guidelines by Sanmar Chemplast in preparation of EIS and public consultation
 - vii. IFC's proposed lending for the PVC sector in light of the POPs Convention

The Public Hearing

On the 16th and 17th of November 2002, an IPT panel consisting of Justice (Retd) J. Kanakaraj (Chairperson), Prof. V. Vasanthi Devi (PhD), Dr. Amit Nair (PhD) and Dr. Kannabiran visited the pollution-impacted communities in and around the SIPCOT industrial estate.

Letters were sent to various Government departments, trade unions, the International Finance Corporation (IFC), the SIPCOT Industries Association and to all the industries in and around SIPCOT, Cuddalore. The arrival of the investigation team and the public hearings were publicised well in advance via posters and pamphlets in Tamil, and with the help of Panchayat leaders at the various villages. Announcements were made during the day of the public hearing as well to ensure participation of the villagers.

November 16: SIPCOT visit and village public hearings at Sonanchavadi, Pachaiyankuppam, Kudikadu and Eachangadu.

The panel visited SIPCOT industrial site. Later the panel also visited Sonanchavadi, Pachaiyankuppam, Kudikadu and Eachangadu villages and held public hearings. The hearings were conducted in Tamil in the Village Squares in the presence of the respective Panchayat Leaders. In Kudikadu, some villagers who are reportedly labour contractors for the factories intimated the tribunal that it could not be held that day as there were "tensions" in the village.

In all the other three locations, the panel made sure that women were interviewed both as part of the larger public hearings and separately at locations more convenient to them within the village. The panel also visited the Uppanar River and examined the ground water from handpumps.

November 17: Public Hearing at Town Hall, Cuddalore

Citizens' groups and members of the public were invited to present their views to the panel at a hall meeting. Two separate sessions, one each for hearing from Government officials and SIPCOT industry representatives were held later at the same venue. The panel held an

exclusive meeting with the representatives of the industries in the absence of members of the community to ensure a fair hearing. Barring the IFC and Chemplast Sanmar - the promoter of the contested PVC project - most of the Cuddalore chemical industries and agencies were represented at the meeting.

All presentations were documented, and written testimonies were obtained from most of the presenters.

HUMAN RIGHTS VIOLATIONS AND INDUSTRIAL POLLUTION IN CUDDALORE

Unplanned Industrialisation

SIPCOT industrial estate in Cuddalore was set up to invite industries to the area with a promise of infrastructure and other facilities. However, 18 years later, the Industrial Estate is sorely lacking in infrastructure for environmental protection. Also, by siting a chemical industrial estate amidst a residential area, not to mention a thriving fishing and agricultural area, exposes the lack of regional planning on the part of the Government. According to M. Nizamudeen of Cuddalore-based consumer organisation FEDCOT, at least 20,000 people live within the pollution impact zone in and around SIPCOT.

Till date, no site has been developed for secure storage of hazardous wastes generated by the industries in the estate. In the absence of such facilities, factories have dumped these wastes on neighbouring lands and in open pits within their factory site. These poisons have leached into the groundwater and contaminated the water resources of communities living around the factory. In the report presented by the Asian Development Bank in 1994, land was identified as the main sink for the effluents. As the number of industries increased, the effluent sink seems to have shifted from land to the River Uppanar, and then the sea.

Mounds of toxic wastes have also been dumped on the banks of the River Uppanar. Foul smelling sludge from SPIC Pharma is dumped in a pit lined with HDPE plastic on the banks of Uppanar. Several companies claim they sell their wastes to other companies as raw material. Companies such as Shasun, Tanfac and Vanavil store much of their toxic wastes on open ground within their premises.

The effects of pollution are palpable. IPT panellist Dr. Amit Nair, a New Delhi-based ecotoxicologist, narrates his experience during the investigations: "I inadvertently touched the water at the riverbank when I was picking a mollusc shell. There was an immediate reaction with severe burning and itching sensation and reddening of the fingers that came in contact with the water. This lasted for over two hours."

Air pollution, according to villagers, is so severe that even metallic objects are affected. During the hearings, villagers showed silver-coloured utensils used that had turned black. Many women mention that their jewellery, metal idols, is tarnished in the polluted air.

The Legal Framework

A number of environmental laws, rules and regulatory mechanisms, including some that deal specifically with industrial pollution and hazardous industries, provide the framework for environmental protection. The chief among these are:

1. The Water (Prevention and Control of Pollution) Act, 1974
2. The Water (Prevention and Control of Pollution) Rules, 1975
3. The Central Board for the Prevention and Control of Water Pollution (Procedure for Transaction of Business) Rules, 1975
4. The Tamil Nadu Water (Prevention and Control of Pollution) Rules 1983
5. The Water (Prevention and Control of Pollution) Cess Act, 1977
6. The Water (Prevention and Control of Pollution) Cess Rules, 1978
7. The Air (Prevention and Control of Pollution) Act, 1981
8. The Air (Prevention and Control of Pollution) Rules, 1982
9. The Tamil Nadu Air (Prevention and Control of Pollution) Rules, 1983
10. Environmental Protection Act (1987)
11. Hazardous Waste (Management & Handling) Rules, 1989
12. Hazardous Chemicals (Manufacture, Storage, Import), 1986
13. List of Industries under "Red, Orange and Green" Categories.

The Constitution of India also accords overarching guarantees relating to environmental quality. Art. 48A of the Constitution casts a duty on the State to protect and improve the environment, and to safeguard the forests and wildlife. Art. 51-A(g) of the Constitution talks of protection of the natural environment including forests, lakes and rivers. India is also party or signatory to a number of international conventions including:

1. Basel Convention on Transboundary Movement of Hazardous Wastes: Besides regulating international trade in wastes, the Convention also sets out obligations for member countries to minimise the generation of hazardous wastes, and adopt clean production practices.
2. Stockholm Convention on Persistent Organic Pollutants: As a signatory to this Convention, India acknowledges the "unmanageable risk" posed by Persistent Organic Pollutants -- a category of deadly (and mostly halogenated) chemicals - and agrees in principle to take action to reduce, with the aim of elimination, all human-made releases of these chemicals.

As a member country of the International Labour Organisation, India is also obligated to observe the labour welfare and occupational safety measures set out in the ILO convention.

Water and Air Acts: Art. 253 of the Constitution of India empowers the Parliament to make laws to implement international agreements. The Air Act 1981 is one such act. With effect from 1 October, 1983, the Tamilnadu Government declared the entire area of the state as Air Pollution Control Area.⁴

The Water Act, 1974, was adopted by Tamilnadu on 31 August, 1981, and the Tamilnadu Pollution Control Board (TNPCB) was constituted by the Government with effect from 27 February, 1982.⁵

⁴ GO Ms. No. 4 (Environment) dt/ 28 September, 1983.

⁵ GO Ms. No. 340, Health and Family Welfare Department dt/19 February, 1982

Both the Water and Air Acts (in Sec. 25 and 21 respectively) require industries to get two separate consents to operate from the Pollution Control Board. The consent shall, unless given or refused earlier, deemed to have been given unconditionally on the expiry of a period of four months of the making of an application in this behalf, complete in all respects to the State Board.

The Water Act also outlines the responsibility of the State, and the liability of polluters. Sec. 24 of the Water Act says:

- (a) "no person shall knowingly cause or permit any poisonous, noxious or polluting matter, determined in accordance with such standards as may be laid down by the State Board to enter (whether directly or indirectly) into any (stream or well or sewer or on land); or
- (b) "no person shall knowingly cause or permit to enter into any stream any other matter which may tend, either directly or in combination with similar matters, to impede the proper flow of the water of the stream in a manner leading or likely to lead to a substantial aggravation of pollution due to other causes or of its consequences."

With relevance to Cuddalore, Sec 25 of the Water Act also prohibits the setting up or using any outlets to discharge sewage or industrial wastes without prior permission from the PCB.

Right to Know: The Water Act requires the State Government to maintain a register containing the particulars of conditions imposed under this section. Sections of the register as relates to any outlet, or to any effluent, from any land or premises shall be open to inspection at all reasonable hours by any person interested in, or affected by such outlet, land or premise, as the case may be, or by any person authorised by him in this behalf.

Toxic Effluents Disposal

The total effluent generated by 22 of 26 functional industries in SIPCOT is 17.7 million litres a day. Until 1999, 7 industries generated more than 95% of the total trade effluents all of which was discharged into the Uppanar (see Table no.1). The remainder was dumped either at sea or in the SIPCOT sewer, and about 1% is recycled or introduced into the solar evaporation ponds.

TABLE 1: Percent of Total Trade Effluents Generated by Major Industries and their Sinks pre-1999

S.no:	Name of the Industry	% Of the total effluents generated	% Entering the River Uppanar	% Entering the SIPCOT sewer
1	SPIC	20.1	20.1	Nil
2	J.K. Pharmachem	13.6	13.6	Nil
3	D.S.Q. Biotech	5.7	5.7	Nil
4	Tanfac (Alf3)	25.2	25.2	Nil
5	Tanfac (Cryolite)	29.9	29.9	Nil
6	Other 17 Industries	4.9	Nil	4.9

SOURCE: NEERI, Nagpur 1999.⁶

Companies in SIPCOT manufacture a variety of chemicals using various processes. It would be extremely difficult to present a clear characterisation of the constituents of such effluents. Generally, the quality of effluents based on some significant parameters is as shown in Table 2.

TABLE 2: Characteristics of Effluents

Parameters	Fluorine Related Chemical	Pharmaceutical Plant	Phosphates/ Chemical Plant	Dyes& Chemical	Chemical
pH	6.5-8.5	7.0	6.9-8.5	7.3	7.0
TDS	450-6,000	500	1,100-1,900	11,670	7,718
TSS	8-145	200	34	66	-
COD	12-160	9,000	20-80	-	2,800
BOD ₅	2-50	4,000	1-5	450	550
Cl	450-2,380	-	270-530	487	70
PO ₄	-	-	4-5	-	-
SO ₄	45-300	-	46-1,300	386	2,500
Fluorine	1-10	-	0.6-4.3	-	-

SOURCE: Asian Development Bank, 1994⁷

The data shows that the effluents produced from the existing units in SIPCOT are acidic or neutral. The TDS content is high, in addition to the levels of Total Suspended Solids, Chemical Oxygen Demand, Biological Oxygen Demand, Chlorides and Sulphates. Fluoride content is in the high range for effluents discharged from the chemical manufacturing units.

Table 3 summarises the total pollutant loads in 1994 that are produced and discharged into the Uppanar river, sewers and on land. The data indicates that the land bore the maximum burden of the total pollutant load.⁸

Table 3. Total pollutant load discharged by SIPCOT Cuddalore

Parameters	Uppanar River	Sewer/Land	Total Pollutant Load
TDS	2,400	35,000	37,400
TSS	120	580	700
COD	200	11,600	11,800
BOD ₅	24	5,000	5,024
Cl	600	5,000	5,600
PO ₄	-	8	8

SOURCE: Asian Development Bank Report, 1994.⁹

⁶ NEERI, Nagpur 1999. "Subsoil Water Quality Assessment in and around the SIPCOT Industrial Complex, Kudikadu Village, Cuddalore." Page 12-13. Figures in the original table pertained to total quantities. Here, they are presented as percentages for ease of understanding.

⁷ Asian Development Bank, 1994. "Tamil Nadu Environmental Monitoring and Pollution Control. T.A. No. 1366-Ind, Final Report -Vol-II" Pg 4.20. Data from Cuddalore District Office, TNPCB 1993

⁸ Tamil Nadu Environmental Monitoring and Pollution Control, Asian Development Bank, T.A. No. 1366-Ind, Final Report -Vol-II, Pg 4.21

According to the ADB report, the Uppanar River showed a moderately high concentration of fluorides, due largely to discharges from TANFAC Industries, a fluorine-based manufacturing unit. TNPCB's monitoring also showed higher fluoride levels in the vicinity of the discharge, ADB reports from data obtained from TNPCB in Cuddalore.

Most of the units in SIPCOT claim to have wastewater treatment facilities to ensure that effluents meet TNPCB standards. However, reduction of Total Dissolved Solids (TDS) is mostly achieved by dilution of treated effluents with freshwater as installed technologies cannot meet the discharge standards.

The ADB report concluded that the treated effluent discharged into the Uppanar contains TDS, chlorides and sulphates in excess of the TNPCB standards. The major concern in the Uppanar, according to ADB, is the high, localised fluoride levels.

NEERI, in their 1999 study for the Tamil Nadu Pollution Control Board of ground and surface water contamination at SIPCOT, found that the river water is "highly contaminated." They advise that "The SIPCOT area with the proposed Phase II requires Regional EIA with carrying capacity of Uppanar River which is acting as a carrier of trade effluents discharged from various units."¹⁰

Common Effluent Treatment Plant

In 1999, 18 years after the first industries were set up, Cuddalore SIPCOT Industries Common Utilities Ltd (CUSECS) commissioned a Common Effluent Treatment Plant (CETP). The CETP claims to collect effluents from 20 member companies, and discharges it at sea through a 2.6 km pipeline after secondary and tertiary treatment. According to CUSECS, the CETP only receives effluents that have undergone onsite primary treatment by the company that generates it.

SIPCOT industries report that they generate 17.7 million litres of effluents per day. The CETP, if run for 24 hours a day, has a capacity of treating 12 million litres. According to a letter by the District Environmental Engineer of the TNPCB, CUSECS receives only 3.5 lakhs to 4 lakh litres per hour of effluents - that translates to a maximum of 9.6 million litres per day. Even by the industries' own admission, nearly 8 million litres of toxic effluents - nearly half the total effluents generated -- are discharged without passing through the CETP.

Going by scientific studies and reports about the performance of CETPs, it appears that CETPs are ill suited to deal with the complex mix of pollutants typically discharged from a cluster of chemical industries manufacturing different products.¹¹ The Indian People's Tribunal had in 1999 published the results of its investigations of similar complaints against common effluent facilities in Gujarat.¹²

¹⁰ NEERI, Nagpur 1999. Subsoil Water Quality Assessment in and around the SIPCOT Industrial Complex, Kudikadu Village, Cuddalore.

¹¹ Greenpeace, November 2000. "Deadly Investments - A call for moratorium on polluting industries in Gujarat."

¹² The Indian People's Tribunal on Environment and Human Rights, February 1999: "Who bears the cost? Industrialisation and Toxic Pollution in the Golden Corridor of Gujarat"

Even with a homogeneous effluent stream, CETPs are only geared to fix certain common parameters such as BOD, COD, pH and dissolved salts. They cannot detoxify heavy metals and do not address persistent organic pollutants.

More importantly, CETPs themselves generate large volumes of toxic sludge that would need to be properly treated and stored for final disposal. In the absence of a secure storage site in Tamil Nadu, it can only be assumed that the toxic sludge generated at CUSECS is indiscriminately dumped, improperly disposed or sold off to other companies as "fuel" or "soil" supplement.

Until the year 2000, industries discharged untreated effluents through pipes and overground channels directly into the River Uppanar. Given that industrial effluents from chemical industries manufacturing or processing persistent environment poisons have been discharged for nearly two decades into the river, it is to be expected that the river sediments will remain polluted in the long-term in the absence of appropriate clean-up.

Villagers assert that CUSECS is mere eyewash. They name companies like Pioneer Miyagi (a bone-meal manufacturer) and JK Pharma as routine polluters who surreptitiously discharge untreated effluents into the river at night. Fisherfolk told the IPT that chemical companies release their untreated effluents to the river during high tides. Fish kills during this time are common, according to them.

Senthamarai Kannan, President of the Kudikadu Panchayat, claims that the Common Effluent Treatment Plant -- touted as a solution -- may itself be a significant source of pollution. "The place where the wastes are dissolved at sea is near Rajapettai. Fishing is affected drastically," he told the IPT.

Groundwater Situation

The coastal zone up to an approximate distance of 50-km inland throughout Tamil Nadu generally possesses sandy aquifers. In Cuddalore district, the region alongside the coast is characterised by unconsolidated soft rock formations, beach sands, alluvium clay, silts, and gravel pebbles. These formations make this area suitable for groundwater development by open wells and tubewells in view of their high porosity and permeability. The groundwater in Cuddalore district is generally at a relatively shallow level of between 2 to 5 metres.

The soft rock region is characterised by three aquifers - first at a depth of 30 metres; second, within the lignite zone at 120-140 metres and the third with alternate sand and clay layers at between 170 and 300 metres.

The entire water requirement for SIPCOT's industries and the other units near SIPCOT is met by extracting groundwater from a depth of 200 metres. Total reported water requirement for the 29 industries in SIPCOT is in excess of 20 million litres per day. Industries outside SIPCOT including major water consumers have their own borewells, and their combined water requirements could add substantially to the total water stress on the local groundwater reserves.

Declining Water Tables

Agriculture, which is the mainstay of the economy in the area, depends almost solely on borewells. The pressure on groundwater from cultivation of water-intensive crops such as paddy and sugarcane along with rapid and over extraction of groundwater to supply the chemical industries has sent water levels plummeting.

P.R.V. Jagannathan, President of the Semmankuppam Panchayat, says that the effects of SIPCOT's water extraction can be felt as far away as his village Poondiyankuppam. "As a village, we have not directly experienced pollution. But we do see some problems with water. SIPCOT has sunk a borewell at 1300 feet. We're finding that we have to go deeper for water. Earlier, 10 years ago, we used to get plenty of water at 40 feet. Now we go to 100 to 200 feet."

By the industry's own admission, out of the 20 million litres of freshwater required by the companies, 18 million litres (90 percent) of the water is released back into the environment as toxic effluents.

Alarmed by the rising pollution and the plummeting water table, Semmankuppam has issued a resolution banning the setting up of chemical or water-intensive industries in the panchayat.

Banks too seemed to have been roped in to address the groundwater scarcity. Speaking at a Government-organised public hearing held in June 2002, K. Thirunavakarasu of the Panruti-based Tamil Nadu Rural Urban Consumer Protection Organisation said that NABARD - a Government bank for agriculture and rural development - has issued a circular advising against loans for pumpsets in Cuddalore owing to the critical condition of the water table.

Salinity Intrusion

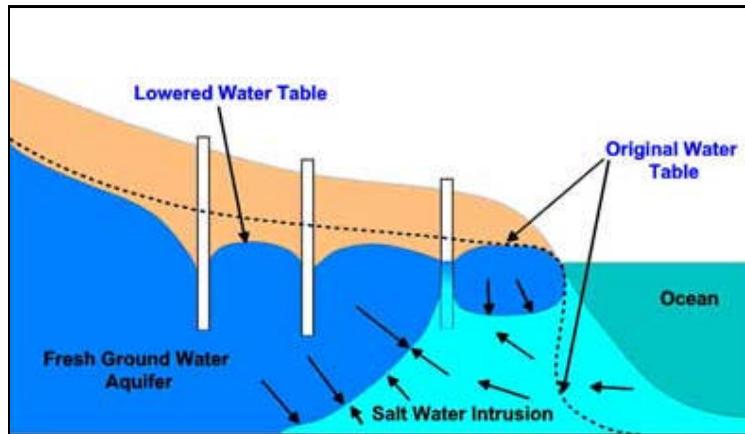
As early as in 1994, the Asian Development Bank had warned of salinity intrusion in the region. "The supply of water to the industries is dependent on groundwater. Since the aquifer in the Cuddalore region is close to the coast, there is a danger of seawater intrusion to the aquifer if there is a severe depletion of its quantity without adequate recharge from other sources. This will result in deterioration of the groundwater quality. Present data show that saline intrusion has already occurred in the Cuddalore coastal area."¹³

A 1993 study by SIPCOT, Cuddalore analysed the groundwater quality from the 200-metre tubewells supplying the industry. The chlorides levels for one of four wells monitored was a high 1070 mg/l - a clear indication that salinity intrusion in the coastal aquifer. The same tubewell had a TDS of 1958 mg/l, almost 4 times the permissible levels.¹⁴

¹³ ADB, June 1994. "Tamil Nadu Environmental Monitoring and Pollution Control," T.A. No. 1366-Ind, Final Report - Vol. II, Pg 4.26

¹⁴ Reported in ADB, 1994. "Tamil Nadu Environmental Monitoring and Pollution Control, Asian Development Bank, T.A. No. 1366-Ind, Final Report -Vol. II" Pg 4.22-4.23, based on TNPCB data, 1993

Villages have wasted money and effort on borewells. "Look at our water. They [Panchayat] sank three bores. All have salt water," says K. Shanthi, a housewife from the fishing village Sonnanchavadi.



The fresh water floats on top of the salt water. As the fresh water is removed and the hydrostatic pressure it creates is decreased, the salt water come farther into the aquifer
Source: <http://www.awqinc.com/salt.html>

Faced with similar groundwater problems, the Union Territory of Pondicherry - barely 40 kilometres away - has a ban on water-intensive industries within 6-kms of the coast. The Chennai Metropolitan Area Regulation Act, 1987, also attempts to regulate groundwater extraction within the Chennai metropolitan area. Since one of the last remaining groundwater reserves are on the coast, the Union Ministry of Environment by S.O.114 (E) dated 19.2.1991, has only permitted groundwater extraction in the CRZ area for domestic/agricultural/horticultural purposes when done manually from open wells.

Groundwater Pollution

The shallow water table and the highly porous nature of soil in the region also mean that any pollution of the land - through discharge of contaminated water or toxic waste dumping - would rapidly affect groundwater.

According to the ADB data quoted in Table 3 above, the land rather than the river received the maximum burden of the total pollutant load. Pollutants discharged to land tend to travel downwards till they reach the water table, and from there begin moving laterally creating a pollution plume, according to a study conducted by the Central Ground Water Board in Vishakapatnam.¹⁵

All villages within or in the immediate vicinity of SIPCOT, without exception, suffer from serious groundwater pollution. Handpumps in the stretch between Thaikalthonithurai and

¹⁵ State of Environment of Andhra Pradesh, Andhra Pradesh Pollution Control Board, Ameerpet, Hyderabad Pg 40, 1999

Semmankuppam have either been disabled or are abandoned. A handpump visited by the IPT panel at Thaikalthonithurai behind JK Pharma factory pumped out black water that smelled of sewage. Ecotoxicologist Dr. Amit Nair notes that "The groundwater, which was extracted through hand-pumps, had a strong stench of chemicals and the possibility of volatile organic compounds (VOC) aromatic hydrocarbons in the water cannot be ruled out."

VOCs include benzene, 1,1,1-trichloroethane, 1,2-dichloropropane, tetrachloroethylene, vinyl chloride, xylene and 1,1,2-trichloroethane can cause a number of health effects. Benzene is known to cause leukaemia; dichloropropane causes anemia and headaches; tetrachloroethylene causes damage to the liver and kidney; vinyl chloride causes irritation in skin and eyes and cancer in humans; xylene damages the liver, kidney and eyes; and trichloroethylene causes eyes, liver and kidney damage.¹⁶ Aromatic hydrocarbons have an adverse effect on cardiovascular systems, on the structure and functioning of the gastro-intestinal tract, liver gall bladder and sense organs.¹⁷ Both, these groups of compounds can enter the environment through industrial wastewaters.

Numerous groundwater sources, including tubewells, borewells and handpumps have been abandoned by villagers due to pollution. People usually abandon a drinking water source if there is foul odour, taste or colour. Such apparent indicators of pollution happen much after the pollution begins. It is quite likely that villagers may have consumed contaminated water until the smell, taste and/or colour became unbearably bad. Also, some toxic contaminants, including biological toxins, heavy metals, pesticides and organic compounds may not contribute to a change in smell, taste or odour.

Groundwater pollution was among the most frequent complaints of villagers who testified to the IPT. Villagers complained that Panchayats have had to bear the expense of digging deeper borewells, and at different locations, to strike fresh water for drinking.

Eachangadu gets its water from 2.5 kilometres away. The village of Thaikal has had to go progressively deeper to get at fresh water. The Dalit settlement, Kudikadu colony, is supplied drinking water in tankers by Shasun Chemicals, which is said to be a notorious polluter. A 1999 study by NEERI for the TNPCB found that Shasun's tanker supplied water had total hardness concentration 2.7 times the prescribed levels.

The NEERI study found that the groundwater in Eachangadu and Kudikadu was contaminated and deteriorating at a fast rate.

The study involved analysis of:

- 24** shallow bore wells in two villages
- 9** deep borewells from the SIPCOT complex
- 1** shallow bore well and two wells of unknown depth inside the SIPCOT complex
- 7** borewells outside SIPCOT (including 5 deep and 2 shallow)
- 14** sampling points along 12 km stretch of River Uppanar

¹⁶ http://www.gem.msu.edu/gw/mcls/volatile_org.html

¹⁷ <http://radburn.rutgers.edu/andrews/project/nbcpr/...pam./ht>

NEERI's analyses found that:

1. 33% of the total samples from Kudikadu village and Eachangadu village had objectionable odour;
2. 75% of the total samples were pale yellow to brown in colour;
3. 75% of the water samples had a disagreeable taste
4. 38% of the water samples from Kudikadu, and 66 percent of Eachangadu samples had turbidity exceeding prescribed limits;
5. 74% of the water samples had TDS exceeding drinking water quality limits; High TDS lends a brackish taste to the water, and can exert a laxative effect if consumed;
6. 49 percent of samples collected from Kudikadu and Eachangadu had total hardness concentration exceeding drinking water limits;
7. 50 percent of the samples from Kudikadu and 60 percent from Eachangadu had chloride levels in excess of the CPHEEO limits;
8. 1water sample from Eachangadu contained fluorides exceeding the tolerance limit;
9. 66% of the samples from Kudikadu and 73 percent from Eachangadu had iron concentrations above prescribed limits;
10. 29 percent of the water samples from Kudikadu and 53 percent of the samples from Eachangadu contained manganese over prescribed limits. Excess manganese can cause damage to brain, liver, kidneys and developing fetuses.¹⁸
11. 33 percent samples from Kudikadu and 33 percent from Eachangadu had zinc levels in excess of prescribed limits;
12. The Dissolved Oxygen (DO) and Chemical Oxygen Demand (COD) for water samples collected at both villages showed that the water is contaminated and deteriorating rapidly.

Similar problems were found with the water quality in borewells inside and outside the SIP-COT complex with colour, dissolved solids, iron, manganese and zinc concentrations exceeding the prescribed limits.

River Water Quality

The 1999 NEERI study found the following about the Uppanar water:

1. The DO in many parts of the river is on the higher side. This is indicative of eutrophication (algal blooms), an unhealthy phenomenon for any water body. The higher oxygen levels trigger rapid growth of organisms followed by a period of inactivity due to depletion of oxygen. Eutrophication is a temporary phenomenon in flowing rivers, whereas in lakes and ponds it can cause lasting damage.
2. 57% of the samples had colours ranging from light green and yellow to brown;
3. The Chemical Oxygen levels at oxidation pond outfalls and at JK Pharma exceed the prescribed limits;
4. All 14 samples showed TDS, chlorides and hardness exceeding their respective standard limits;

The high TDS and chloride concentrations indicate that the river water is highly contaminated. Many aquatic species are very sensitive to small fluctuations in parameters such as turbidity, chloride levels and dissolved solids in water.

¹⁸http://www.ucsc.edu/news_events/press/press_rele../manganese.htm

Pollution and Its Effects on Aquatic Species

Life in an aquatic ecosystem is affected even by slight variations in a number of parameters or water quality indicators.

Total Dissolved Solids: Total dissolved solids is the measure of particles that are dissolved in the water. It may include all suspended solids that may or may not pass through a filter.

Dissolved solids may come from organic sources such as leaves, silt, plankton, and industrial waste and sewage. Other sources come from runoff from urban areas, and fertilizers and pesticides used on lawns and farms.

The density of the total solids determines the flow of water in and out of an organism's cells (osmosis). The nutrients like nitrate and phosphates are important for the growth of organisms. However, an increase in TDS could kill freshwater species as the excess ambient TDS in water would create sea-water like conditions that are detrimental to freshwater organisms. NEERI results show 40-90 fold increase in TDS levels and this would undoubtedly have a severe impact on the river ecosystem and growth of fish.

Total Suspended Solids: Suspended solids are those solids trapped by a filter and can include anything from silt and plankton to industrial wastes and sewage. High concentrations of total suspended solids in a river or lake can lower water quality and cause water balance problems for individual organisms. Low concentrations of total solids may limit the growth of aquatic life. At higher levels of TSS, light penetration and hence photosynthetic activity is reduced. Also reduced are visibility and gill action. As solid material settle to the bottom, the benthic organisms are affected.

Colour and Turbidity: Both colour and turbidity affects the transmission of light in the river water. Phytoplankton depends upon light for photosynthetic activity. Any disturbances in the physical factors like light, temperature and TDS will have a negative effect on photosynthetic activity, and the availability of plant food for aquatic organisms. The NEERI study reports that 57 percent of the river water samples had colours ranging from light green and yellow to brown.

Dissolved Oxygen: Oxygen, in water, is measured as dissolved oxygen (DO). If more oxygen is consumed than is produced, dissolved oxygen levels decline and some sensitive animals may move away, weaken, or die. In aquatic systems, DO is distributed according to various factors such as temperature, salinity and biological activity. When consumption of oxygen exceeds the availability and replenishment rate, the water and life within gets starved of oxygen. When DO is in excess of normal levels, a cycle of eutrophication and oxygen starvation sets in. The NEERI study found the DO in many parts of the river to be on the higher side.

Biological Oxygen Demand: When organic matter decomposes, microorganisms (such as bacteria and fungi) feed upon this decaying material and eventually it becomes oxidized. Biochemical oxygen demand, or BOD, measures the amount of oxygen consumed by microorganisms in the process of decomposing organic matter in stream water.

BOD directly affects the amount of DO in rivers and streams. The more rapidly oxygen is depleted in the stream, the greater the BOD. This means less oxygen is available. The detriment of high BOD is the same as low dissolved oxygen: aquatic organisms become stressed, suffocate, and die.

Sources of BOD include leaves and woody debris; dead plants and animals; animal manure; effluents from pulp and paper mills, wastewater treatment plants, feedlots, and food-processing plants; failing septic systems; and urban storm water runoff.

pH+ is the percentage of hydrogen ions (H⁺) in a solution. A solution is more acidic when it contains more hydrogen ions. The level of acidity of the water is important to the plant and animal life there. Most animals are adapted to living in neutral conditions. Changes in pH endanger the lives the organisms in the water.

SOURCE: [http://www.green.org/files.cgi/435_Chem_Parameters.html#Total Dissolved Solids](http://www.green.org/files.cgi/435_Chem_Parameters.html#Total%20Dissolved%20Solids)

Illegal Units: Condoning Pollution

Companies regulated under the Water and Air Acts are required to commence operation only after obtaining Consent to Operate, subject to periodic renewal. This certificate is to be issued by the Pollution Control Board after stipulating conditions and ascertaining the ability of the company to meet the conditions and function without polluting the water or air.

A report submitted by the Cuddalore District Environmental Engineer to the Tamil Nadu Pollution Control Board lists the consent order details for some of the industries in SIPCOT¹⁹. The report finds that most of the companies in and around SIPCOT are operating illegally without valid consent orders as mandated by the Air and Water acts. No action has been taken by the TNPCB despite their knowledge of these violations.

In fact, the absence of valid consents is more a case against the TNPCB than the industries. Sec. 25 of the Water Act, 1974, and Sec. 21 of the Air Act, 1971, prohibits any person from

Name of Company	Consent order validity expired
SPIC Pharmaceuticals	31.03.1996
Vanavil Dyes	22.04.2003
Asian Paints India Ltd	31.03.1999
Shasun Chemicals	31.03.2002
JK Pharmachem Ltd	31.03.2002
Tantech Agro Chemicals Ltd	31.03.2001
TANFAC Industries Ltd (AIF3 plant)	31.03.2003
TANFAC Ind Ltd (Cryolite plant)	31.03.2003
TAGROS	31.03.2002
Loyal Super Fabrics	31.09.2002
BPN Dyes	30.06.2002
Victory Chemicals P Ltd	31.03.2003
Kumar Chemicals Corporation	30.06.2002
Calac P Ltd	31.03.2002
Omnicast Precision Products P Ltd	31.03.1999
Vijaya Industrial Products P Ltd	30.06.2002
Morgan Industries Ltd	31.03.1998
Anbu Cashew Chem (P) Ltd	30.06.2000
Kumaran Carbonates P Ltd	30.06.2000
MAB Metal	No consent order issued
Colix Beverage	31.03.2002
Bayer Sanmar Ltd	31.3.1999
Atofina Peroxides (India) Ltd	31.3.1999
Pioneer Miyagi	Not Available
CUSECS	No Consent to Operate

SOURCE: TNPCB, 2002

¹⁹ Letter DE/TNPCB/CUD/F.3632/2002, dated 22-08.2003, Er. Palaniswamy, Dist. Env. Eng. TNPCB.

operating any industrial plant without the previous consent of the Board. However, the consent shall, unless given or refused earlier, deemed to have been given unconditionally on the expiry of a period of four months of the making of an application in this behalf complete in all respects to the State Board.

The District Environmental Engineer could not explain the serious lapses on the part of the Tamilnadu Pollution Control Board as to how industries are operating without valid consents, illegal discharges of effluents including through tanker lorries.

Similarly, under the Hazardous Wastes (Management and Handling) Rules, 1989/2000, hazardous wastes generated by companies cannot be stored onsite beyond a period of 90 days. However, it is an established fact that most companies store their wastes on site for years, including some that have stored it on open ground since their inception. Vanavil Dyes and Chemicals, which reportedly generates 1400 tons/year of toxic sludge is storing the wastes "in the impervious platform within the premises of the unit," according to the District Environmental Engineer. The Engineer observes that sludge arising from the ETP containing Calcium Fluoride at TANFAC "is being dumped as (sic) huge quantity in the back side of the unit."

Despite the scale and widespread nature of violations, there is little evidence of punitive actions taken by the regulators. The engineer's report lists only three companies as having closed or threatened with closure for environmental violations. Two of the three companies are small units.

The District Environmental Engineer's letter reports an accident in Square D chemicals, which led to the poisoning of several people. The unit, which was operating illegally without consent, was shut down only after the people organised a salai mariyal (rasta roko or road block). It is thus clear that unless people undertake an agitation, the authorities do not take drastic action. In Shasun Chemicals and Drugs Limited, a fire on 2.7.2002 killed one person and injured two others. Ministers visited the place and the packing section was closed. It was reopened on 23.7.2002.

The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 requires the occupier of the industry to prepare and keep up-to-date an onsite emergency plan detailing how major accidents will be dealt with on the site on which the industrial activity is being carried on and that plan shall include the name of the person who is responsible for safety on the site and the names of those who are authorised to take action in accordance with the plan in case of emergency.

The Rules also require the concerned authority - the TN Pollution Control Board -- to prepare and keep up-to-date an adequate off-site emergency plan detailing how emergencies relating to a possible major accident on that site will be dealt with. In preparing that plan the concerned authority shall consult the occupier, and such other persons, as it may deem necessary.

Polluting with Impunity

"The Tagros factory in Pachaiyankuppam of the SIPCOT industrial estate manufactures many products using Cyanide as raw material. Cyanide, as you all know, can kill a human being within a fraction of a second.

"The wastewater is transported through lorries and let out into the river. The river water gets poisoned and the fish are killed. When fisherfolk go into the river, this poisonous water affects the skin and starts peeling off and causes wounds. Skin rashes are common; people faint and are unable to work anymore. The river water has a layer of oily substance. Moreover, Cyanide-bearing air is emitted out as smoke, and this affects the animals, birds and trees and plants.

"Tagros has built a new plant without approval. Without the approval of the Panchayat President, which Government gave them the authority to produce more killer chemicals? How can they run the plant without approval? How can they use Cyanide? What is the Pollution Control Board doing?

"If this situation continues, all villages in SIPCOT, goats, cows, birds, plants, fish and human beings would have to face extinction. Therefore, we request that the permit to Tagros be cancelled and the workers of that factory be given alternate jobs elsewhere."

*Translated from a written testimony in Tamil submitted to Justice (Retd) Kanakaraj by:
V. Mani, President; N.V. Balu, Treasurer; R. Elumalai.
Thaikkalthonithurai Village Panchayat, Pachaiyankuppam.*

The Factories Act of 1948 and Tamil Nadu Factories Rules of 1950 also requires units engaged in hazardous processes or dealing with hazardous substances to prepare and implement a disaster management and emergency preparedness plan. However, no such plan seems to be in evidence in SIPCOT. Villagers neither know about the nature of potential hazards nor are prepared in the event of any emergency such as a gas leak or an explosion.

The IPT questioned the industry and TNPCB representative on some of the observations in the District Environmental Engineer's letter. For instance, it is mentioned in the report that CUSECS began running a Common Effluent Treatment Plant in 2000. CUSECS collects effluents from 20 industries through a network of six sumps and discharge them to sea through a 2 kilometre pipeline after treatment. The sumps, which collect untreated effluents and the pipeline that traverses the river to reach the sea lie within the Coastal Regulation Zone. According to the CRZ notification, such activities require the clearance of the Central Government. The representatives of CUSECS were unable to tell the IPT whether such clearances had been obtained.

Officials of CUSECS testifying before the Indian People's Tribunal admit that the Common Effluent Treatment Plant does not have the legally mandated "consent to operate." In other words, the CETP is itself an illegal unit. It was also found that by constructing on the no-development zone of the sensitive CRZ I area, CUSECS has violated the Coastal Regulation Zone notification of February 1991. Again, the TNPCB official present at the hearing was at a loss to explain how CUSECS was allowed to set up and operate without a valid consent in blatant violation of the CRZ notification.

A CUSECS representative admits that they occasionally receive improperly treated effluents from their member companies. However, he says, rather than report the violation to the

Pollution Control Board, CUSECS merely discusses the matter with the company with a view to minimising future violations.²⁰

The DEE's letter maintains that water samples are collected in and around SIPCOT area, and from river Uppanar. However, the results have not been disclosed to us. A continuous Ambient Air Quality Monitoring Station was commissioned on 15th July 1998. It is under repair since 2001.

It is also admitted that there were complaints of discharge of untreated effluents through tanker lorries. The local office of TNPCB conducted an enquiry and a report submitted on 11th March 2002. However, no copy was furnished to the Tribunal. Similarly a report is said to have been sent after investigation on the death of fishes in Uppanar River. Again no copy was furnished to the Tribunal.

The letter however refutes the charge of discharge of effluents at night through tankers. It is not clear as to how the TNPCB investigated this serious charge without the help of police. The complaint of odour in the surrounding areas from Methyl Mercaptans and Shasun Chemicals and Drugs Limited and from Mycelia sludge generated by M/s. Spic Pharmachem Ltd is admitted. By way of response the letter only says steps are being taken to mitigate the nuisance. It is further stated that the polluting industries are being frequently inspected and monitored.

Impacts of Industrialisation on Agriculture and Farmers

Testimonies by villagers suggest that lands for SIPCOT have been acquired unjustly. While some villagers have refused to accept compensation for their lands because the amount offered was too low, others who have sold their lands have seen their landholdings fragmented to sizes unviable for practising agriculture. Their requests that the rest of the land also be acquired remain unheeded.

"My family lost 12 acres in 1986. We were offered Rs. 5000 per acre. We refused to take it. We were asked to submit a protest letter and receive money. We did that and filed a case. Some people have received court orders for compensation to the tune of Rs. 1,20,000 per acre, but the money has not been disbursed. Others are awaiting court orders," says A. Raja Bhuvanendran, president of the Pachaiyankuppam Panchayat.

Anandan from Kudikadu, who was awarded Rs. 80,000 per acre, says, "We have not received the money yet. The case has gone for appeal and we have decided that we will take the cash in total and not in instalments."

Across SIPCOT, at Sangolikuppam, the story is no different. A. Velayutham, a 52-year old farmer, says "I had about 2 acres of land where I would plant groundnuts, paddy. They took away one acre. Now a factory has come up on it. What do I do on one acre? I asked them to take that away too. But they refused."

²⁰ Testimony of CUSECS representatives to the Indian People's Tribunal on November 17, 2002.

Other farmers such as 65-year-old K. Chandrasekharan of Semmankuppam lost their borewells with portions of the land "forcibly acquired" for SIPCOT. "After they took away the land with a borewell, I had little option but to part with the rest of the land," he says.

Sangolikuppam's L. Govindarasu, in his written submission to the IPT, echoes a concern common to many farmers in the belt. "I have been a farmer for years. Due to pollution, my land has turned salty. The Pioneer Company, which was started in our area, has affected our land. The water has become hard. For 11 years, the land has not been cultivated. I request you to give me some avenues to earn my livelihood," he says.

As observed earlier, in the absence of any facilities to deal with poisonous wastewater or toxic wastes, companies have resorted to indiscriminate discharge of their wastes. Besides directly affecting fertility of the land, such practices also poison the groundwater used for irrigation. Farmers in the region report that yields have plummeted even while costs of extracting water have increased because new or deeper borewells have to be dug to as an alternative to the contaminated groundwater in existing wells.

Pointing to a patch of land behind SPIC Pharma that was marsh-like and foul-smelling with effluents, A. Velayutham from Sangolikuppam says, "That's my land. That 33 cents of land is destroyed because of wastewater."

The Asian Development Bank's 1994 report observes that "The disposal of effluents with high levels of TDS will result in the degradation of topsoil quality." The ability of plants to absorb nutrients can be altered by changes in TDS. Discharge of effluents on land, as has been and continues to be the practice in many SIPCOT industries, alters the soil's organic matter content and hampers the ability of soil organisms to replenish the organic content.

The 1999 NEERI study too found that irrigation water was high in hardness and chloride concentration.

Just in Eachangadu, more than 50 acres of land remains uncultivated for 15 years, according to J. Ramasami, an agricultural labourer from the village. Lands in this region were fertile enough to yield two to three crops a year before the onset of industrialisation.

In a written submission to the IPT, Samikannu, Vice Co-ordinator of the DMK Farmers Wing from Pachaiyankuppam, says, "Ground water has been spoilt. The wastewater has affected the water springs and, therefore, the agriculture. Coconut, mango, tamarind and cashew yields are affected right at the flowering stage due to the air pollution."

In Kudikadu, farmers showed IPT samples of groundnuts that were wrinkled and small in size. According to them, such effects began to manifest themselves with the advent of industrialisation.

Farm workers complain of sores on their limbs because of contact with contaminated water and sludge. Those working in fields close to factories also face the threat of injury due to gas leaks or other such mishaps.

Ambujam from Eachangadu reports that her husband and their bullock fainted while ploughing their field due to a poisonous gas leak from a chemical factory. She says that neither her bullock nor her husband has fully recovered.

Raising livestock - cattle, chicken or goats - is now a rare activity in SIPCOT villages. Villagers say that is because livestock don't survive too long in the contaminated environment of SIPCOT.

S. Vasantha, Co-ordinator of the Vadamallee Women's Group from Eachangadu, says cattle die routinely after drinking contaminated water. "There is no water here. Ever our cattle can't drink it. Cows here have died after drinking it. I have seen it myself. . .the stomach bloated and dead."

The air quality too has a bearing on crop performance. Leaves of plants have stomata or pores through which gaseous exchanges happen. Air pollution compromises the efficiency of stomata.

Similarly, fluoride emissions even at low concentrations can seriously damage vegetation.

Impacts of Industrialisation on Fisherfolk

Fisheries in the villages of inland fisherfolk lining the River Uppanar say they have been hardest hit. Marine fisherfolk, particularly those living at the mouth of the river (Thaikal) and from Rajapettai where effluents are discharged at sea by CUSECS, also say they are affected.

Among the key problems reported by them:

- Local extinction of select fish species;
- Decline in fish catch, size;
- Frequent fish kills;
- Chemical odour in fish and resultant reduction in marketability and price of fish;
- Health effects among fish consumers, including fisherfolk and dalits fishing for home consumption;
- Skin diseases and ulcers among fisherfolk exposed to contaminated river water and sludge.

Ramesh Babu, a small merchant from the Cuddalore Old Town market, sums up the bleak situation facing Cuddalore fisheries. "We used to have Rs. 50 lakhs of fish sale in the Cuddalore area. Now it's just Rs. 15 lakhs. Wastes from the chemical factories have destroyed the ocean resources. Fish exports have been affected because chemical inputs have compromised the quality of fish making them unacceptable in foreign markets. People are scared to buy them even in the local market," Babu told the IPT.

"If we are to live off the river, the pollution has to be stopped. We have no other resort but the river. We don't have the ability to fight. We don't want to depend on anybody. Just give us the river. Companies may come and go, but if we have the river, we can survive," says Sonnanchavadi's Mrs. K. Selvi whose husband is a fisherman.

The number, nature and location of industries along the Uppanar are itself problematic. All industries are located within 1050 metres of the River. TANFAC, which produces fluorides, lies 65 metres from the river. Five other major "Red" industries are located within 100 metres of the Uppanar River. Until 1999, the Uppanar served as a carrier of industrial effluent. Since then, a portion of the effluents is diverted to the sea.

Testimony: D. Dhanakodi, Sonnanchavadi.

"The companies came up here 15 years ago. We catch fish even near the companies. Earlier we used to make Rs. 100 per day. Now Rs. 25 per day. Look at this man. He spent nearly eight hours today and caught only Rs. 10 worth of fish.

"Nets that normally last a year don't last beyond three months. Shrimps are the most lucrative fish. But they just don't grow. They die young. Our fish have to come from the sea, near Cuddalore. But they don't come up here. They smell the effluent and swim back.

"All of us get sores on our hands and feet, a burning sensation.

"Fish kills are a monthly phenomenon. Discharge from the Pioneer "bone" company caused a fish kill 1.5 months ago. All the fish were belly up. The wastewater comes from an illegal pipe under the water line at Pioneer. Also, Vanavil, DSQ, SPIC and Shasun all have such pipes.

"Elf [Atofina] and Bayer let out their effluents into the river from a tank. They claim that the water is released inside the factory. But workers say they release it into the river through a hidden pipe. Usually, they release the wastewater during the highest tides - during full moon or new moon.

"Earlier, we used to collect fuel wood from the premises (now owned by Elf and Bayer). Now they have fenced it off and we have lost access to firewood."

Translated from interview in Tamil by Nityanand Jayaraman (Journalist) on 3 March 2002.

The health problems peculiar to fisherfolk exposed to toxic water and river sediment from Uppanar are discussed below in the section titled: "Impact of Industrialisation on Health and Well being."

Impacts of Industrialisation on Health and Well-being

Despite the fact that the IPT visited SIPCOT on a weekend, pollution in the air within the industrial estate was palpable. From JK Pharma in the North to Pioneer Miyagi in the South, one encounters a variety of chemical odours. Tribunal members too report a noticeable stench of chemicals in the air around SIPCOT, a "sort of suffocating and choking atmosphere." Some odours may not be toxic, but even these are a nuisance and can cause chronic headaches and nausea. Villages such as Kudikadu, Thaikal, Eachangadu and Sonnanchavadi lie in a virtual "gas chamber" surrounded on three sides by chemical factories and bounded on the fourth by the river.

Air pollutants can exert very serious effects because they can enter directly into the brain unlike pollutants from water or food. Until 1998, no data was available on the air pollution that SIPCOT residents were exposed to. In July 1998, an Ambient Air Quality Monitoring Station was set up. The system has been inoperational since November 2001.

Villagers liken the atmosphere in SIPCOT to a slow-motion Bhopal, with gas leaks and routine air emissions that debilitate the local residents. "In Bhopal, people died on a single day. Here, we die every day," says Semmankuppam president P.R.V. Jagannathan.

"The pollution in this area is severe. I have difficulty breathing and chest pains. My children too suffer from respiratory problems. During nights, the level of noise around SIPCOT is extremely high. Over the last six months, I have been experiencing an itch in various parts of my body. Despite treatment, this is showing no signs of improving," says B. Venkatesan of Eachangadu.

The lack of adequate and accessible health facilities and poverty make any improvement in the situation remote. "We earn so little, and we keep falling sick. How are we supposed to spend on illnesses? Our children are always suffering from something or the other," says Lalita, a resident of Eachangadu.

"At night, the stench engulfs us. We just can't breathe. There's nothing we can do except go indoors and shut all doors. We can't bear it. Our eyes burn. We feel like somebody is tearing them, and our chest feels suffocated every time the wind brings the smell," Lalita adds.

Solai, Lalita's neighbour adds: "When the stench sets in, at least we can cover our noses with a cloth. What will the infants do? That's why they're always sick. We can't do anything and nobody cares."

Villagers say visits to the hospital are frequent and expensive. "Whatever we earn goes for medical expenses. We spend 4000, while we earn only Rs. 1000," explains one villager. In the absence of quality Government health facilities, "villagers have been consulting with private doctors, who charge upto Rs. 100 for a half-hour check-up," says another from Pachaiyankuppam.

The general health malaise is only exacerbated by the poor conditions of living and hygiene in these villages. Experts prescribe a minimum of 100 litres per person per day as the amount of water required for drinking and to maintain adequate hygiene.²¹ But the prevailing local water scarcity due to degradation of water resources has made access to even the minimum water requirement impossible.

Children in the villages, women claim, are prone to frequent illnesses. Headaches, fevers, cold and cough, skin diseases, intelligence deficits, listlessness and developmental problems ranked among the most frequent complaints made by village women regarding their children's health. The women say the health of their children improves remarkably when they leave their villages.

In Sonnanchavadi, villagers report that none of the girl children below the age of 15 has attained puberty. Similarly, boys and girls below 18 years are physically underdeveloped.

²¹ Falkenmark, Malin and Carl Widstrand. 1992. "Population and Water Resources: A Delicate Balance." Population Bulletin. Population Reference Bureau

IPT member Dr. Amit Nair had a separate meeting with women. He says, "At Sonnanchavadi, I had a separate meeting with 19 women. Most of them complained of tingling sensations in their fingers, tremors, headaches and dizziness. Their health problems are mentioned below:
13 of them had skin problems (skin irritation)
16 had respiratory problems
1 reported irregular periods
According to the women, these problems are commonplace in SIPCOT, and have started in the last 7 to 8 years."

In September 2002, Uppanar fisherfolk stopped fishing after all active fishermen began developing serious skin problems. They attributed the problems to an illegal discharge of acidic effluents from Pioneer - a routine occurrence, according to them. Despite the fact that an illegal outlet to Uppanar was identified by the fisherfolk and dismantled by the Pollution Control Board subsequently, both the Pollution Control Board representative and Pioneer companies have denied the charge that the pipe was used for illegal discharge.

An investigation into the process employed at Pioneer found that the company uses large quantities of hydrochloric acid to dissolve bones (and manufacture Ossein). The New Jersey Department of Health warns: "Contact [with hydrochloric acid] can cause severe skin burns and severe burns of the eyes, leading to permanent damage with loss of sight. Exposure to dilute solutions may cause a skin rash or irritation."

A submission by the Joint Director of Health Services, Cuddalore, corroborates the charges by the fisherfolk against Pioneer Miyagi for discharge of untreated acidic effluent into the river. "On 20.9.02, 13 persons (fishermen) suffered chemical burns due to effective/discharge from SIPCOT industries into Uppanar River," the statement read.

When the fisherfolk approached the District Collector for compensation and action against the polluter, the Collector is reported to have dismissed their concerns and advised them to look for an alternative livelihood.

Despite the magnitude and visible nature of the problem, no health data exists for this region. In October 2002, NGOs FEDCOT and CorpWatch requested public health specialist Dr. R. Sukanya (M.D) to look into reports of the September 2002 occupational injuries among fisherfolk, and the general state of health in SIPCOT.

In her report submitted to the IPT, Dr. R. Sukanya states:

"Chemical pollution of the river Uppanar and of the general environment has clearly degraded the quality of life of the villagers in the two hamlets visited - Sonnanchavadi and Eachangadu.

"In the fishing village of Sonnanchavadi, chemical contamination of the river poses a serious and ongoing occupational health threat. The fact that the villagers have been forced to stop fishing - and suffer wage losses - is a violation of their fundamental and constitutional guaranteed right to livelihood.

"Health problems among people due to exposure to environmental toxins is an important public health problem. Threat of emerging antibiotic resistance, eye problems, chronic compromise of lung functions, high morbidity among children, lack of proper medical care and rehabilitation, medical apathy are all highlighted in the case studies from Eachangadu."²²

In conclusion, Dr. Sukanya notes the need for a comprehensive health assessment of the villagers and SIPCOT workers, and "active measures to stop the contamination from the nearby factories and to restore the quality of the water to prevent further damage to health of all."

Three case histories

A 40-year old woman supplying tea to a nearby factory for the last fifteen years is suffering from symptoms of acute onset breathlessness relieved only with treatment in a hospital. This is a probable case of asthma. A more thorough investigation may be conducted to see whether more cases of similar asthma are reported in the village. Occupational or environmental exposure to discharges from pharmaceutical factories - like the Penicillin unit -- could increase the chance of allergic drug-induced asthma.

Mr. Pachaiappan, age 50, was a contract worker in SPIC when he developed progressive skin lesions on his Right foot and the toes started shrinking. His work involved standing in effluent treatment plant sludge and loading it into a truck. He was operated and his toes removed. The company through the contract agent met his hospital charges and gave him Rs.10, 000 as compensation. No proper rehabilitation was attempted and presently, he has lost his ability to earn a livelihood and is in need of physiotherapy and crutches.

Ms. Anjalai, employed previously at SPIC, suffered a fall that injured her neck and paralysed her right upper and lower limbs. SPIC met her hospital charges and provided some monetary compensation. Currently, she is house-ridden, has developed contractures of both lower limbs and the suture wound on the right side of the neck is infected. Anjalai reports that she was sent back without proper treatment at the Cuddalore General hospital as she lacked previous medical records.

SOURCE: Dr. R. Sukanya, "Preliminary Enquiry into the Health Problems of People Living in Villages around SIPCOT Industrial Area, Cuddalore." November 2002.

Employment and Working Conditions

Chemical industries are not particularly labour intensive. Jobs, where they do exist, tend to be at levels that require trained and educated personnel, or of a kind that is inherently hazardous and of an unprotected daily wage nature. The latter is typically managed by labour contractors to save costs and avoid liability.

Villagers say companies in SIPCOT refuse to employ local people as labour for fear of reprisal by the community in the event of a mishap. "Manual work is available, and even that to a small extent. In general, employment opportunities are poor; even the literate do not find employment," says S. Ravichandran of Pachaiyankuppam.

²² Dr. R. Sukanya, MD (Community Medicine). 2002. "Preliminary Enquiry into the health problems of people living in villages around SIPCOT Industrial Area, Cuddalore"

As Semmankuppam Panchayat President Jagannathan emphatically states, "So far, industrialisation has brought us no benefits in any way, only problems."

Fatalities, accidents and injuries, though frequent, are not always reported to the authorities by the Company. Neither do companies pay adequate compensation to the victims or their families.

A young contract worker said: "I was working in Shasun repairing the pipeline on the orders of the operator. Then an accident occurred. Sulphuric acid passing through that pipeline splashed on my face and chest. My face was burnt. The company assisted me in getting my treatment in the Cuddalore Kannan Hospital. Apart from that, Shasun Company did not give me any other compensation." This accident was not reported to the Factories Inspector as required under law. (See Table No. 4 for details regarding the number of deaths and serious accidents at SIPCOT.)

Jawahar, an inspector of police from Cuddalore OT says that because subcontractors fail to maintain the legally required paperwork, taking action on complaints becomes difficult. "SIPCOT records of accounts and attendance registers are not maintained properly. Contract labourers' attendance is maintained on the back of cigarette packs. The company administration is also interested only in getting the work done and doesn't interfere with the contractors. We're therefore not in a position to take any action against anyone, even though we get complaints from many quarters."

In *Consumer Education & Research Centre and others v. Union of India and others* (1995) 3 SCC.42, the Supreme Court ruled that "the right to health to a worker is an integral facet of meaningful right to life." However, neither is adequate measures to protect workers' health taken by the companies or enforced by authorities, nor are regular check-ups performed to monitor the health of workers. The transient nature of the workforce employed by labour contractors complicates the task of monitoring workers' health.

The Contract Labour Abolition Act requires labour contractors and the principal employers to register themselves. In the absence of such registration, ensuring the legal protection of the contract workers becomes difficult. However, it is not known if the labour contractors and employers adhere to the requirements of the Contract Labour Act.

Union Busting

"I was working in the Pioneer Company for four years. My job was to clean the bones. It was not a permanent job. Now, I have been suspended from work. They literally pushed me out. I have submitted my complaint to many people. Another woman, my colleague, died at work. I have filed a case about that. Govt. does not give any assistance. I have worked in Pioneer Company for four years. We packed bones. There were 60 women who do that work. When the Japanese came, they would hide the women. As per rule, they should give us uniforms and bonus after a year's service. They made me the leader of my unit. When we struggled for our rights, they kept a watch over me. One day, when I went to the toilet, I was blocked and threatened. 'Are you planning to set up a union? Let me see what the union can do?' After that they stopped me from work. I filed a complaint. They could not do anything to the case by giving money. Another girl died because of her allergy to the chemicals. She was not even given Rs 502, the money for 22 shifts of work, yet."

Testimony of V. Damayanthi, Sonnanchavadi

Table No.4

Serious Accidents and Deaths that have occurred in Cuddalore SIPCOT Industrial Estate between the years 1999-2002

Industry	1999		2000		2001		2002		Total	
	Deaths	Accidents								
Tanfac Industries				1		4		1		6
Asian paints Ltd.				1		1				2
Bayer Sanmar						1				1
Shasun Chemicals and drugs	1								1	
Super fabrics									1	2
Agrostar Ltd.										4
SPIC Pharma				2						3
JK Pharma	1								1	4
EID Parry						2			1	4
Total	2	11	2	5		9		1	4	26

Source: Factories Inspectorate, Cuddalore

PROPOSAL FOR AN IFC-FUNDED PVC FACTORY BY SANMAR CHEMPLAST

Chemplast Sanmar, a Chennai-based company with interests in plastics and other chemicals, including ozone-depleting chlorofluoro carbons (CFCs), has proposed to manufacture 170,000 tonnes of Poly Vinyl Chloride (PVC) per year at SIPCOT Phase II in Semmankuppam Panchayat, Cuddalore. The factory will convert vinyl chloride monomer - a known carcinogen that poses serious explosion risks - into PVC, and use 120,000 litres of water/hour in the process.

The Rs. 500 crore project is awaiting environmental clearance and financial closure, including a loan from the International Finance Corporation (the private sector lending agency of the World Bank) and DEG, a German bilateral trade development bank. According to the company, upto 100 jobs for professionals may be created in addition to 200 jobs indirectly in "support activities like material loading/unloading, security, catering and servicing of equipment."

According to information provided by the company, the factory will manufacture a range of PVC grades to suit various applications. The box below shows details of the various grades of PVCs their applications and Capacity TPA.

K Value	Application	Capacity TPA
K 56	Clear / bottle grade	35,000
K 60	Film grade	40,000
K 66	Pipe grade	70,000
K 70	Cable grade	25,000
Total	1,70,000	

Villagers and environmentalists contend that the project should not be allowed to set up owing to its hazardous nature, the poor track record of the company, and the high water requirements of the factory.

They accuse the IFC of promoting a technology known the world over for its role in generating persistent organic pollutants. They allege that the IFC has ignored violations of its own requirements for community consultation and participation by the company, and has failed to come clean on its policies in promoting activities that violate international laws such as the Stockholm Convention on Persistent Organic Pollutants, and many domestic policies.

At the time of writing of this report, news articles indicate that Chemplast has decided to relocate its project to Krishnapatnam, a coastal village in Nellore district, Andhra Pradesh. However, the International Finance Corporation said it has no confirmation of this decision.

Neither has any statement been released by the Government or the company denying or confirming this news.

Local Sentiment

Local communities were unaware of the proposal until early 2002 when public interest groups brought it to the notice of the villagers. However, at the statutorily mandated public hearing held in June 2002, community members showed up in numbers and vociferously opposed the proposal for the PVC factory. Separately, more than 150 women, and several Panchayat leaders, MLAs, MPs and even US politicians have written to the International Finance Corporation advising them to deny the loan to the project on environmental grounds, and pointing to violations by the company of IFC guidelines relating to consultation and participation with the community.

Villagers' testimonies to the IPT too indicated widespread opposition to the new project. "If the new Chemplast Company comes here, then 75 persons out of 100 will voice their objections. The villagers would vacate this place in a few years," says V. Mani, a Panchayat leader from Thaikalthonithurai.

A 1999 Panchayat resolution by the Semmankuppam Panchayat, where the factory is set to come up, prohibits the setting up of any chemical or water-intensive industry within Panchayat limits.

"We don't want another factory here. We know that it's a plastic factory, and that plastic is very dangerous. Our lives are in danger. Our women's group leader went to Madras. She says even if it comes in the next village, we'll try and stop it," says Solai, a housewife from Eachangadu.

The IFC, DEG and Chemplast have not responded to letters sent by the IPT secretariat inviting them to the public hearings held in Cuddalore in November, 2002. The Compliance Advisor/Ombudsman's (CAO) office of the IFC, though, has said it has registered a complaint against the company from villagers and is in the process of investigating the complaint. Barring the information proactively provided by those opposed to the project, the IFC has neither requested nor taken any independent action to verify the merits of the citizen complaint against Chemplast and PVC in the lead up to making its decision on funding the project.

Nevertheless, community resistance to the project has delayed the IFC approval process and a vote on the project by IFC remains indefinitely postponed.

The Case against PVC

PVC is known the world-over as a poison plastic, whose entire lifecycle - manufacturing, use and disposal - is associated with the release of environmental poisons including persistent organic pollutants (POPs). POP chemicals are persistent in the environment and human tissue, and build up over time in the water, air and food chain. POP chemicals are known to cause a wide range of human health effects, including cancer, immune system and repro-

ductive system damage.

Over the past few decades, Polyvinyl Chloride (PVC) plastic, also known as "vinyl," has become one of the most widely used plastics. Applications include in packaging, home furnishings, children's toys, automobile parts, building materials, irrigation and drainage pipes and hospital supplies.

Detailed discussions about the various problems caused during the life cycle of PVC are available from a variety of sources.²³

In summary, these problems include:

1. Manufacturing: Chlorine, and its derivative vinyl chloride monomer, are key raw materials for the manufacture of PVC. Chlorine is converted to ethylene dichloride (EDC) and subsequently to VCM. PVC is produced by the polymerisation of VCM. The production of EDC and VCM involve the generation of large quantities of dioxins and furans, two of the most notorious chemical poisons known to science. VCM is a volatile chemical and a proven human carcinogen. The polymerisation process from VCM to PVC involves the release of VCM, and is associated with the threat of VCM leaks and spills. The polymerisation process may also result in the release of dioxins, furans and polychlorinated biphenyls (PCBs), especially if the facility includes an incinerator to burn VCM wastes. Depending on the process, the manufacture of chlorine - the basic ingredient - too may release substantial quantities of toxins, including mercury (for mercury cell processes) and chlorinated poisons.

2. Use: Raw PVC granules are brittle and unsuitable for direct use as plastics. In order to impart desirable properties - for e.g. flexibility, colour, durability - raw PVC has to be pumped with additives, plasticisers, softeners, stabilisers and colouring agents, all of which are chemicals. Many of these chemicals are known to have toxic effects. Some phthalates, a category of chemicals commonly used as plasticisers, are suspected to cause cancer and are known to suppress the immune system. Lead, cadmium and other heavy metals, which are known to be toxic, are commonly used as stabilisers and as colouring agents. Because these chemicals are bound very loosely to the plastic, they tend to leach out from the products.

Examples of potential human exposure are as numerous as the PVC products themselves. The smell of new car interiors - of toxic phthalates - is a familiar example of what experts call chemical "fogging" from PVC products. Plasticizers have been shown to be directly transferred from PVC plastic "cling film" to food. Teething rings and soft PVC toys that are commonly used by children are known to leach out toxic additives much in the way that a wet sponge leaches water. The U.S. Consumer Product Safety Commission issued a warning in 1996 when it discovered that PVC miniblinds were releasing lead-containing dust. Lead can have serious effects on the mental development of children.

²³ Robert Edwards & Rachel Kellett. "Life in Plastic." Other India Press 2001.

3. Disposal: PVC is among the least reprocessed plastics globally. Reprocessing of PVC is environmentally polluting - it releases additives (discussed above) and potentially dioxins and other POPs. Also, because reprocessed PVC tends to be of a lower grade than virgin PVC, it cannot be indefinitely reprocessed. As a result, most of the post-consumer PVC waste ends up as part of the general municipal waste stream. The abundance of PVC items in medical waste and garbage is one of the reasons why incinerators are considered the largest anthropogenic sources of dioxins in the environment. Landfills too may contribute significant POPs loads to the environment due to the incessant fires that characterise such dumps.

In its ongoing study of dioxins, the US Environmental Protection Agency (USEPA) suggests that there is no safe level of dioxin exposure. The USEPA has also concluded that the dioxin loads currently found in many adults and children in the US are already at levels known to cause significant health effects.

Many countries around the world, including India, recognise the polluting nature of PVC, and regulate its manufacture, use and disposal through restrictions and even outright bans.

For instance, the Biomedical Waste and Municipal Waste regulations expressly prohibit the combustion of chlorinated plastics (such as PVC). Other countries, particularly in the EU, prohibit the use of phthalates in soft plastic toys meant for use by infants and toddlers. The parliament of Slovakia voted on May 16, 2001, to pass a new Waste Management Act that envisages the reduction of PVC waste, and bans the production and trade of all PVC products, including packaging starting January 1, 2008. (Refer Annex II on Slovakia Law). PVC bans and phase-outs are in effect in various cities around the world, including Aachen and Bonn, Germany. (Refer Annex II on global PVC restrictions)

PVC - What we know is bad news

Because dioxin and other chlorinated chemicals can migrate around the world, the harmful effects of PVC production are felt everywhere. Some communities, however, are hit far harder than others. World over, such dirty industries are sited among economically or socially disadvantaged communities. Thirteen out of 14 U.S. plants that make VCM (vinyl chloride monomer, the building block used to make PVC) are located in Louisiana and Texas, near African American or Latino communities. These plants release huge amounts of toxic chemicals into the environment around them, which in turn contaminate local drinking water supplies, and the food chain.

Many PVC facilities are located in poor communities with little political clout. Government policies sanction and encourage this practice. In the U.S., poor African-American communities are disproportionately impacted. In the most severe cases, entire communities have been literally wiped off the map. In 1987, the town of Reveilletown, Louisiana became so contaminated that all 106 residents were relocated and every structure, including the church, torn down. Management of the nearby Dow Chemical factory followed suit soon after, buying out the entire town of Morrisonville, Louisiana. A similar problem exists near Dow Chemical's VCM plant in Plaquemine, Louisiana, where African American residents had been exposed to VCM through their groundwater.

A Critique of Chemplast's PVC project and its Rationale

Community members and environmental groups contend that Chemplast has withheld information about potential releases of POPs from the factory, and seriously underreports the sources, quantum and nature of other toxic emissions.

Dr. Mark Chernaik, staff scientist at the Environmental Lawyers Alliance Worldwide (ELAW-US) studied the Environmental Impact Assessment submitted by the company. From a scientific and technical point of view, several concerns arise from the study:

1. Just from one source - the dryer exhaust - VCM emissions will exceed the standards promulgated by the State of California South Coast Air Quality Control District by a factor of 20.
2. In predicting ground-level concentrations of VCM that would result from the factory's operation, the company uses a model that assumes only two sources of emission, while ignoring the contributions of numerous other major sources of fugitive emissions - pumps, compressors, pressure relief devices, connector and valves. Even conservative estimates indicate that fugitive emissions alone could exceed the Californian standard by six times.
3. The EIA for the PVC plant lacks a health assessment of predicted ground-level concentrations of VCM. The proposed PVC factory imposes a significant and heightened risk of various forms of cancer to the community living nearby. Chemplast has neither acknowledged this nor provided an assessment of the cancer risk faced by the community.
4. The EIA lacks an assessment of potential for dioxin emissions despite an admission by the company that it plans to incinerate VCM wastes.
5. The EIA fails to provide a life-cycle assessment of PVC's impacts to the environment. VCM incineration is likely to release "**substantial** amounts of PCBs and dioxins because of the strong tendency of VCM combustion products to form these potentially toxic substances," according to Dr. Chernaik.
6. The Environmental Action Plan for the PVC plant lacks a leak detection and repair program. Neither does it present a contingency plan for responding to major VCM leaks and spills.

SOURCE: *Evaluation of Environmental & Social Impact Assessment Report for the Proposed PVC Project at Cuddalore, Tamil Nadu and Environmental & Social Impact Assessment for the Marine Terminal Facilities for the PVC Project near Cuddalore, Tamil Nadu*; Mark Chernaik, Ph.D., Staff Scientist, Environmental Law Alliance Worldwide, U.S., March 2002 (To see the full Critique of Chemplast's PVC project and its Rationale Refer Annex I)

Additionally, despite knowledge that VCM exposure at the workplace is linked to heightened risks of certain cancers among workers, the company makes no mention or provides no assessment of the threat. VCM is a human and animal carcinogen, according to the International Agency for Research on Cancer (IARC). Scientific studies among VCM factory workers confirm a link between occupational exposure to VCM and the development of angiosarcoma (cancer) of the liver.

Violation of IFC Requirements

The International Finance Corporation (IFC) and the World Bank Group (WBG) require their projects to comply with an array of policies and standards. In screening projects before funding for probable environmental and social impacts, the IFC has developed a comprehensive set of protocols under its Environmental and Social Review Procedure (ESRP).

However, there is prima-facie evidence that Chemplast Sanmar has violated IFC requirements.

At the same time, given the body of evidence pointing to PVC as a significant contributor to the global POPs load, IFC's support for such projects run counter to the intent and mandate of the Stockholm Convention on Persistent Organic Pollutants.

1. Under the Environmental and Social Review Procedure of the International Finance Corporation (IFC) (www.ifc.org/enviro) *"The project sponsor must ensure compliance with host country requirements."*

The High Powered Committee (HPC) on Hazardous Wastes that was empowered by the Supreme Court in the Writ Petition No. 657/95 (*Research Foundation for Science, Technology and Natural Resource Policy v. Union of India and others*) has made specific recommendations on projects that generate Persistent Organic Pollutant (POPs) emissions or manufacture products that release POPs in their lifecycle.

The HPC recommends that:

*"(v) It is imperative that Government declare and take steps to ensure that expansion of existing hazardous waste industries and new industries of this nature follow the basic parameters of Clean Production. . . They must not be permitted to employ technologies or processes that intentionally or unintentionally generate endocrine disrupting chemicals or persistent organic pollutants. Nor should they be permitted to generate products whose final disposal would poison the environment with such chemicals or pollutants; in such cases, they must have a cradle to grave responsibility."*²⁴

The Chemplast proposal does not even mention the policy recommendations of the HPC. Neither does it refer to India's obligations under Stockholm Convention to reduce and prevent the environmental releases of POPs.

Secondly, the company ignores the fact that the Semmankuppam Panchayat has issued a resolution prohibiting the establishment of any chemical or water-intensive industries within its village limits.

2. The Environmental and Social Review Procedure of the International Finance Corporation (IFC) states that (www.ifc.org/enviro) *"IFC does not finance project activities that would*

²⁴ "Report of the High Powered Committee on Management of Hazardous Wastes - Volume I" Submitted to the Hon'ble Supreme Court in the matter writ petition No. 657/95 (*Research Foundation for Science, Technology and Natural Resource Policy v. Union of India and ors*). p. 245, 2001

contravene country obligations under relevant international environmental treaties and agreements, as identified during the Environmental Assessment."

India is a signatory to the Stockholm Convention on Persistent Organic Pollutants and therefore it is obligatory on its part to act in accordance to the mandates and guidelines set by the Convention.

Article 5(c) of the Stockholm Convention on requires states to *"Promote the development and, where it deems appropriate, require the use of substitute or modified materials, products and processes to prevent the formation and release of the chemicals listed in Annex C. "*

Part V of Annex C of the Stockholm Convention on "General Guidance on Best Available Techniques and Best Environmental Practices" reads: *"...Priority should be given to the consideration of approaches to prevent the formation and release of the chemicals listed in Part I. Useful measures could include...(d) Replacement of feed materials which are persistent organic pollutants or where there is a direct link between the materials and releases of persistent organic pollutants from the source."*

The Convention further requires the World Bank and other multilateral lending institutions to assist industrializing countries to implement the mandates of the Convention.

Setting up a 170,000 tonnes/year PVC factory represents the release of substantial quantities of POPs during its lifecycle - particularly during the manufacture of VCM, the raw material for PVC, the incineration of VCM and the disposal of PVC. This addition of substantial loads of POPs into the environment contravenes the wisdom and requirements of the POPs Convention. Interestingly, substitutes exist for virtually all applications of PVC.²⁵

Rather than assist India in implementing the Convention, IFC's lending would actively cause India to contravene the Convention.

The conflict between IFC's lending and the Stockholm Convention has been pointed out to the IFC's Compliance Auditor Ombudsman's office. On November 6, 2002, Rachel Kyte of IFC's CAO office wrote that IFC's policy on PVC and POPs is the "subject of an advisory memorandum from our office to senior management of IFC." While the letter does not reveal what the policy advice is, it clearly points to a lack of clarity within the IFC regarding its funding of projects that contravene the Stockholm POPs convention.

The interactions with the IFC and the CAO on this matter, says CorpWatch's Nityanand Jayaraman "is characterised by vagueness and by the IFC's singular inability or unwillingness to verify the claims made by Chemplast. The CAO was unable to provide a justification for IFC's proposed funding of the project despite the evidence against PVC and the availability of alternatives to PVC in all applications."

²⁵ Greenpeace 1996, "The Stranger" p. 89. See also, Jamie Harvie and Tom Lent, "Preliminary PVC-free Pipe Analysis." Healthy Building Network, 2002.

3. The IFC has identified that *"For meaningful consultations, the project sponsor provides relevant information in a timely manner and in a form and language that are understandable and accessible to the groups being consulted."*

Elaborating on this important requirement, the IFC statedly requires project sponsors to consult *"relevant stakeholders at least twice: a) during scoping and before the terms of reference for the EA are finalised, and b) once a draft EA report is prepared. For the initial consultation, the project sponsor provides a non-technical summary of the report's findings . . . should be provided in advance of consultation and proactively disseminated to local stakeholders in a form and language meaningful to those being consulted."*

At no time has the project sponsor informed the local communities about the nature of the chemicals manufactured at the proposed VCM-PVC factory site. No non-technical summary was provided before the report was finalized. Neither was such a non-technical report provided **after** finalisation of the report.

Till date, the company has not approached the public to seek their informed consent. Even for the statutorily mandated public hearing conducted by the State Government on June 7, the company only provided documents in English. In fact, the villagers living near the proposed factory site are largely illiterate. Seeking their informed opinion would involve providing information to the people not via documents in English or Tamil, but in a "form. . . that are understandable and accessible to the groups being consulted."

The entire requirement of consultation has been done away with by the project sponsors.

4. The absence of a social impact review in Chemplast's project documentation contravenes IFC's committed policy on Social Review Procedures, which states *"Category A projects proposed for IFC financing require an EA to ensure that they are environmentally and socially sound and sustainable."*

Chemplast has failed to even attempt a social impact analyses of the project. It assumes that the project is setting up in a vacuum, in an environment devoid of issues, resource conflicts or opposition.

The NEERI report on groundwater calls for a regional EIA in light of the existing strain on the environment due to chemical industries. The State Human Rights Commission recommends a prohibition on chemical industries in the region. The Panchayat where the company proposes to set up has issued a resolution prohibiting chemical or water-intensive industries. Any consultation with villagers would have indicated to Chemplast that chemical projects were unwelcome in the region.

Besides these acts of omission, the company actually states in its EIS that the River Uppanar is of no economic value to villagers. A social survey would have indicated that at least 15 vil-lages depend almost solely on the fish from Uppanar for a livelihood.

OBSERVATIONS OF PANELLISTS

The Tribunal visited the subject areas on 16th November 2002 and conducted a public hearing on 17th November 2002 at the Town Hall, Cuddalore, between 10.00 a.m. to 06.00 p.m. It was heartening to note the presence of representatives from almost all the industries in the afternoon session. Equally, the presence of officers from the Pollution Control Board, the Health Department, the Ground Water Department and Revenue Department was a welcome sign of involvement of the Governmental and Quasi Governmental authorities. It was easy to hear and see both sides of the problem. However, representatives from the International Finance Corporation and Chemplast Sanmar did not attend the consultations.

The Department of Health, the Central Groundwater Board and the Factories Inspectorate representatives who appeared before the tribunal came well prepared. Comments made by these individuals acknowledged that industrial activities and pollution were a serious issue in Cuddalore. The industrial representatives and the Pollution Control Board representative, however, were dismissive of the pollution-related allegations. Interestingly, neither the PCB official nor the industry or SIPCOT representatives were able to provide any material evidence to refute the charges of the villagers. A number of studies and scientific reports that were alluded to were not shared with the tribunal. The CUSECS effluent treatment plant, apparently operating without the TNPCB's consent and in violation of the CRZ notification, is itself illegal, and none of the representatives present were able to explain the illegality.

Through our visits to various parts of SIPCOT and interviews with villagers, we learnt about life in pollution-impacted villages. We learnt about the prevailing sentiment towards industrialisation. At the outset, it would be appropriate to observe that the pollution-impacted communities are economically disadvantaged. The dalit settlement of Kudikadu, and the village of Eachangadu are among the worst affected villages, hemmed in as they are by polluting industries. The socioeconomic status of the communities, particularly the dalits, impedes their ability to articulate their problems and demands, and reduces their chances of a fair and quick response from the Government. Cuddalore presents another example of environmental injustice and discrimination, where the poor and the disadvantaged are disproportionately impacted by the "costs" of "development."

The fact that chemical industries pose pollution problems is not unknown to the Government. Therefore, even while creating the SIPCOT complex, the Government should have taken preventive measures and set up a special body to look into the effects of effluents and air pollution. They should have also set up a Judicial Tribunal to assess complaints and award adequate long-term or one time payment of compensation.

The Judicial Tribunal could have also fixed appropriate compensation for acquisition of lands from the poor villagers. This would have avoided the sad state of affairs existing even as on date. Villagers say they have not received legitimate entitlements upon dispossession of

lands even after 18 long years. If that were the case, where is the chance of assessing and compensating their losses on account of environmental damage and damage to health?

The Pollution Control Board which has been empowered to fulfil its responsibility of protecting the environment from pollution, and punishing polluters has been seriously remiss in carrying out its mandate. Blatant violations of environmental laws are tolerated, and polluting industries have been allowed to operate without consent. The TNPCB has shown remarkable restraint in using the powers vested with it to punish repeat polluters. The TNPCB is as culpable as the polluters in perpetrating the human rights violations in Cuddalore.

The absence of complaints from workers, especially the contract labourers, should not be seen as absence of a problem. Contract workers are among the most vulnerable and neglected in terms of workplace safety and job security. Such labourers are hired by labour contractors reported to be corrupt and in collusion with the industries. Not only are they deputed to hazardous activities inside the factory, but also expected to perform without adequate safety equipment or training. The system of compensating workers or their families for accidents and deaths seems arbitrary, and seldom involves relevant statutory authorities.

Villagers and local bodies have suffered material losses due to industrialisation and industrial pollution in the SIPCOT region. Wells, borewells and handpumps installed at considerable public expense have had to be abandoned because of groundwater contamination. Villagers are forced to spend disproportionately on medical costs to treat chronic ailments, many of which are caused or aggravated by pollution. Fisherfolk and farmers have seen their earnings diminish as pollution drastically compromised the productivity of local resources including land, river and groundwater.

We saw listless children in many of the villages. Discussions with their mothers revealed a startling epidemic of childhood disorders - respiratory problems, skin diseases, attention and intelligence deficits, and developmental problems. Unchecked industrialisation, it seems, has affected even the next generation.

Our recommendations are based on the evidence presented by the villagers, our inspection notes, and representations by experts, NGOs, concerned citizens, the industry and Government. Also, in recommending reparations and future steps, we draw heavily upon the rationale and justice embedded in two legal principles -- the Polluter Pays Principle, and the Precautionary Principle.

The Hon'ble Supreme Court in *Vellore Citizens' Welfare Forum v. Union of India* (1996) 5 SCC.647 considers both principles integral features of "sustainable development" and defines them as follows:

Polluter Pays: ". . . Once the activity carried on is hazardous or inherently dangerous, the person carrying on such activity is liable to make good the loss caused to any other person by his activity irrespective of the fact whether he took reasonable care while carrying on his activity. The rule is premised upon the very nature of the activity carried on."

Precautionary Principle: "Environmental measures - by the state government and its statutory authorities - must anticipate, prevent and attack the causes of environmental degradation. . .Where there are threats of serious and irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. . .The 'onus of proof' is on the actor or the developer/industrialist to show that his action is environmentally benign." The process of applying the Precautionary Principle must be open, informed and democratic, and must include potentially affected parties. It must involve the examination of the full range of alternatives, including no action.

Elaborating on the Polluter Pays principle in the *M.C. Mehta (Taj Trapezium case) v. Union of India* (1997) 2 SCC 353, the Supreme Court ruled that "The "Polluter Pays" principle as interpreted by the Court means that the absolute liability for harm to the environment extends not only to compensate the victims of pollution but also of restoring the environment degradation."

Examination of the material and evidence before us leaves us with no doubt that SIPCOT industries have polluted the environment, and continue to do so. We're also convinced that adequate and appropriate steps have not been taken by regulatory authorities, particularly the TNPCB, to prevent pollution and health damage. Neither has the Government paid any attention to the concerns and complaints of villagers.

It would be a gross violation of the human rights of local villagers to even contemplate the expansion of polluting industries or the setting up of a new chemical factory in Cuddalore. The proposal to set up in Cuddalore a PVC factory - known as one of the most notorious polluters - is patently unjust.

It is not uncommon that victims of human rights violations are often victimised again by the same institutions that they approach for redressal. Lack of action, delays in delivering justice, ignoring complaints are all acts that revictimise impacted people. In the interests of justice, therefore, we hope that these recommendations are acted upon without delay.

FINDINGS AND RECOMMENDATIONS

Chemplast Sanmar's PVC factory

1. All available evidence suggests that PVC is a dangerous product that pollutes at all stages of its lifecycle. It also appears that adequate alternatives exist for all applications of PVC. Local villagers are overwhelmingly opposed to the Chemplast PVC project. Moreover, India is a signatory to the Stockholm Convention on Persistent Organic Pollutants. Setting up a PVC project which is known to add to the environmental load of POPs runs counter to India's obligations under the Convention. We recommend that the proposal for having a PVC factory should be given up once and for all.
2. The International Finance Corporation, with its mandate to facilitate overall development in industrialising countries, should review its policies to ensure that there are no contradictions between their lending and the obligations by them and the countries where their money is invested vis-à-vis international treaties and conventions.
3. The IFC should clarify how it will implement the Stockholm Convention, starting with its position on funding PVC or other POPs-generating projects.

Compensation, Relief and Rehabilitation - Land, Health, Livelihood and Environment

4. **Land:** Many villagers are awaiting compensation 15 years after their lands were acquired, often against their wishes. Adequate compensation at market rates should be paid to villagers whose lands were acquired for SIPCOT. If this fails to happen, villagers should consider consolidating all land acquisition compensation cases for submission to Lok Adalat.
5. **Loss of Ecology:** The damage to land, river and groundwater is extensive and caused by the industries. The damage to the natural resources has led to an impoverishment of local villagers due to their consequent ill health and the degradation of their livelihood bases. The Loss of Ecology Authority should be approached to ensure that SIPCOT villagers receive full financial compensation for their accumulated losses, including loss of health, ability to work, lost opportunity costs and real livelihood losses due to damage to land or water.
6. **Environmental Remediation:** The Government must initiate steps to identify the extent and nature of environmental degradation, and begin remediation of the land and water at the expense of the polluting factories in SIPCOT.
7. **Health Compensation:** Villagers of Cuddalore have been impoverished by the mount-

ing medical costs, and the inability of people to earn a living due to poor health. The Government should make the industries compensate the villagers for their damaged health, the cumulative medical costs and lost man-days due to poor health.

8. **Health Monitoring/Rehabilitation:** The acute water scarcity, polluted water and air have made life unliveable in SIPCOT. Villagers, particularly children, suffer from a range of serious health effects. The Government should set up immediate and long-term health monitoring programs, starting with a comprehensive health survey. It should also make the industry pay for long-term medical rehabilitation, through medical facilities that are accessible to and for the villagers.
9. **Economic Rehabilitation:** Rather than create jobs, industrialisation has robbed many local people of their livelihoods by degrading their livelihood bases, and seriously compromised their ability to work for a living due to health problems. The industry and Government should pay for the initiation of employment training and provide sustainable livelihood opportunities as part of an economic rehabilitation program.
10. **Relocation:** Many areas in SIPCOT are not fit for human habitation, and are not likely to be for years to come in the absence of drastic remediation measures. Some villagers have expressed their desire to escape from SIPCOT. The Government and Industry should relocate and resettle willing villagers with suitable arrangements made for their sustained survival in the new location, even while ensuring that those who chose to stay behind are not victimised by pollution. It goes without saying that the Polluter Pays principle has to be strictly adhered to.
11. **Workers Health:** Virtually nothing is known about the exposure to poisons in the work place among the labourers. The Factories Inspectorate, along with the Tamilnadu Pollution Control Board, should commission independent health studies among workers to ascertain occupational exposure and its effects.

Community and Workers' Rights

12. **Workers Rights:** The Government should enquire into the registration of labour contractors and principal employers with a view to stopping the exploitation of contract workers. It should inquire into the implementation of labour protection and welfare measures prescribed under Contract Labour (Abolition) Act, 1970.
13. **Right to Investigate/Sample:** Communities should be empowered to enter the premises of factories to take samples, and to ensure compliance with regulations.

Punishing Polluters

14. **Closure of illegal Units:** Illegal units, including a majority of factories operating without valid licences, should be shut down and the Pollution Control Board should set right the institutional inadequacies that led to its inaction despite knowledge of the illegalities. Industries must be allowed to continue only if they function in full compliance with existing regulations. Our suggestion is to issue a lawyer's notice calling

upon the Tamilnadu Pollution Control Board to direct closure of defaulting industries and call upon all industries to get consent within a period of one month from the notice. If the notice is not complied with, a PIL may be file in the High Court, Chennai seeking the same relief.

15. **CRZ Violation:** CUSECS has set up holding tanks for toxic effluents and a network of pipes on CRZ I land. This is in blatant violation of the CRZ notification. It also appears that CUSECS has been functioning since 1999 without a valid consent from TNPCB. These illegalities should be examined and immediate action should be taken against CUSECS.
16. **Compensate Workers:** Factories that are ordered to be shut down for pollution reasons should be made to pay adequate compensation to workers (both staff and contract workers) for loss of work.

Policy Recommendations

17. **No Polluting Industries:** SIPCOT Phase II should be restricted to non-polluting industries which are not water-intensive. Such industries must commit to providing employment locally, beginning with people who may have lost their lands to SIPCOT.
18. **Clean Production:** Statewide, industries must be required to implement a time-bound program towards clean production and pollution prevention, rather than pollution control.
19. **Industrial Siting:** The Central Government should notify rules that prohibit the setting up of hazardous or polluting industries near residential areas.
20. **Groundwater Regulation:** The Tamilnadu Government should ban the extraction of groundwater from coastal aquifers for industrial purposes, and launch an aggressive groundwater regulatory regime based on scientific assessments of groundwater capacity, and the prioritised needs of drinking water for communities and agriculture


Justice J Kanakaraj

Dr. Amit Nair
Dr Kannabiran
Prof. Vasanthi Devi

ANNEXURE I

**EVALUATION OF ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT REPORT
FOR THE PROPOSED PVC PROJECT AT CUDDALORE, TAMIL NADU**

Prepared by:
Mark Chernaik, Ph.D.
March 2002

INTRODUCTION

Vinyl chloride monomer (VCM) is one of the most potent carcinogens known to human health experts. According to health experts with the State of California Air Resources Board, lifetime exposure to as little as 1 part per billion by volume (ppbv) of vinyl chloride would cause an additional case of cancer in each 5,000 exposed individuals: "... Using the best estimate of cancer unit risk, an estimated 200 cancers may occur in one million people exposed to 1 ppbv of vinyl chloride for a 70-year lifetime." California Air Resources Board Staff Report (March 1991) "Proposed Identification of Vinyl Chloride as a Toxic Air Contaminant," (<http://www.arb.ca.gov/toxics/summary/vinyl.htm>.)

1. In the EIA for the PVC Plant, Proposed VCM Emission Rates Would Exceed International Standards

It is clear that VCM emission rates from the proposed PVC plant would exceed international standards.

Page 6-31 of the EIA for the PVC Plant (Table 6.8 - Summer of Plant Emissions and Source Data Inputs for Modeling) shows that the PVC plant would emit 0.283 grams of VCM per second from its major process source, dryer exhaust. This is equivalent to a VCM emission rate of more than 1,000 grams (1 kilogram) of VCM per hour.

This rate of emissions would greatly exceed that permitted by international standards. For example, under standards promulgated by the State of California South Coast Air Quality Control District: "The owner or operator of the air pollution control equipment specified in this rule shall at all times operate such equipment at an efficiency sufficient to limit the total amount of vinyl chloride in the discharge of all such control equipment at less than 50 grams per hour for polyvinyl chloride plants and less than 50 grams per hour for both ethylene dichloride and vinyl chloride plants. Such 50 grams per hour limit shall apply to the discharge of control equipment serving all polyvinyl chloride plants on a premise." South Coast Air Quality Control District, Regulation XI, Rule 1163 - Control of Vinyl Chloride Emissions (Adopted June 7, 1985). (<http://www.aqmd.gov/rules/html/r1163.html>)

VCM emission rates from dryer exhaust at the proposed PVC plant would exceed this standard by a factor of 20!

2. In the EIA for the PVC Plant, Modeling of Ground-Level Concentrations of VCM Omits Major Sources of VCM Emissions

To its credit, Chemplast used a computer model to predict ground-level concentrations of VCM that would result from operation of its plant (EIA for the PVC Plant, Section 1.9.4). However, this model incorrectly assumed only two sources of VCM emissions: 1) Vent 1 Dryer Exhaust; and 2) Reactor Fugitive Emissions. See: EIA for PVC Plant, page 6-31. This fails to include numerous major sources of

VCM emissions. Therefore, predicted ground-level concentrations of VCM will be far less than that stated in the EIA. What follows is a discussion of major sources of VCM emissions that Chemplast omitted:

2.1. Other fugitive sources

Chemplast assumes that all of its fugitive emissions from its PVC plant will stem from the PVC reactor. See EIA for PVC plant, page 6-31.

To assess the validity of this assumption, I solicited input from Mr. Warren Johnson of the U.S. Environmental Protection Agency.

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Organic Chemicals Group
Emission Standards Division
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Tel: 1-919-541-5124
E-mail: Johnson.Warren@epa.gov

Mr. Johnson is the U.S. EPA's foremost expert on PVC plant emissions and headed U.S. EPA efforts to draft new hazardous air pollutant emission standards for PVC plants.

According to Mr. Johnson, it is incorrect to assume that the fugitive emissions from the PVC reactor will be the only source of VCM emissions from a PVC plant. Operation of a PVC plant would **also** generate fugitive emissions of VCM from **pumps, compressors, pressure relief devices, connector and valves**.

For example, although fugitive emissions of VCM from PVC plants in the U.S. are strictly regulated, a U.S. PVC plant (Oxy Vinyls PVC plant in Louisville, Kentucky) reported more than 3018 kilograms of fugitive emissions of VCM in 1992, and 2740 kilograms of fugitive emissions of VCM in 1999. This plant produced 153,000 tons of PVC in 1992 and 260,000 tons of PVC in 1999. Therefore, the rate of fugitive emissions of VCM improved from 0.02 kg per ton in 1992 to 0.01 kg per ton in 1999. Chemplast will produce PVC at a rate of 21.25 tons per hour. See EIA for PVC plant, page 1-1. Generously assuming that fugitive emissions of VCM from Chemplast's proposed PVC plant will be at the midpoint of these two values (0.015 kg per ton), fugitive emissions of VCM from Chemplast's proposed PVC plant will be more than 300 grams per hour.

It is likely that fugitive emissions will greatly exceed this rate because Chemplast lacks a Leak Detection and Repair program (see below).

2.2. Evaporative emissions of VCM from the discharge of treated effluent

As Chemplast correctly points out: "VCM entering aquatic systems is rapidly lost to the atmosphere through volatilization. The volatilization half-time of VCM from surface waters ranges from several minutes to a few hours ..." See EIA for PVC plant, page 6- 20. Therefore, Chemplast must take into account evaporative emissions of VCM from the discharge of treated effluent. Chemplast predicts that it will discharge 1,980,000 liters per day of treated effluent that will contain up to 1.0 milligrams of VCM per liter. See EIA for PVC plant, page 4-23 and 6-70. Therefore, discharge of treated effluent will result in up to 82.5 grams of VCM emissions per hour.

3. The EIA for the PVC Plant Lacks a Health Impact Assessment of Predicted Ground-Level Concentrations of VCM

Correctly predicting ground-level concentrations of VCM is only half of the analysis. An EIA for a proposed PVC plant must then assess how these predicted ground-level concentrations will impact human health.

This will require Chemplast to:

- 1) Determine the number of persons residing within contours containing VCM ground-level concentrations above background levels.
- 2) Predict the increased incidence of cancer that would be caused among this population by multiplying the number of exposed individuals, the VCM ground-level concentration for the exposed individuals, and the best estimate of cancer unit risk (20×10^{-5} ppb⁻¹) from exposure to VCM. It should be noted that lifetime exposure to as little as 1 ppb of VCM would cause an additional case of cancer for each 5,000 exposed individuals!! More than 25,000 persons live within 3,000 meters of the plant. See EIA for PVC plant, page 5-9.

It is not sufficient to merely observe that predicted ground-level concentrations of VCM will be below applicable ambient air quality standards. See EIA for PVC plant, page 6-57. VCM is a carcinogen "having no threshold exposure level below which no significant adverse health impacts are anticipated." California Air Resources Board Staff Report (March 1991) "Proposed Identification of Vinyl Chloride as a Toxic Air Contaminant," (<http://www.arb.ca.gov/toxics/summary/vinyl.htm>) Therefore, additional cases of cancer would still occur with VCM ground-level concentrations that are below applicable ambient air quality standards.

4. The EIA for the PVC Plant lacks an Assessment of Potential Dioxin Emissions

Although incineration of VCM serves to control atmospheric emissions of this potent toxic, it would also serve to form and release into the atmosphere other chemical substances that are equally toxic yet far more persistent: polychlorinated biphenyls (PCBs) and polychlorinated benzo-p-dioxins and polychlorinated benzofurans (dioxins).

To assess the potential of a VCM incinerator to form and release PCBs and dioxins, I sought input from Dr. Brian Higgins, a leading expert on the formation of chlorinated toxins that result from incineration of chlorinated organic compounds such as VCM.

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According to Dr. Higgins, incineration of VCM would result in the formation of PCBs and dioxins in the post-combustion zone of the incinerator. According to Dr. Higgins, it would be possible to estimate the amount of PCBs and dioxin formed in the combustion zone using chemical kinetic modeling software that calculates PCBs and dioxin formation based on the design features of the VCM incinerator.

It is my opinion that the VCM incinerator would release **substantial** amounts of PCBs and dioxins because of the strong tendency of VCM combustion products to form these potentially toxic substances.

In a recent study, scientists with the U.S. Environmental Protection Agency evaluated the correlation

between levels of numerous low-molecular-weight chemical compounds and the levels of PCBs and dioxins that form post-combustion of a variety of waste fuels. Lemieux, P.M., et al. (2000) "Prediction of Dioxin/Furan Incinerator Emissions Using Low-Molecular-Weight Volatile Products of Incomplete Combustion," Journal of the Air & Waste Management Association, Vol. 50, pp. 2129-2137.

This study found that levels of vinyl chloride in exhaust gas were the **strongest surrogate indicators** of the levels of dioxins in the exhaust gas. According to the authors of this paper: "It is not surprising that vinyl chloride would yield some of the best regression fits, considering the overall importance of the vinyl chloride radical in chlorocarbon combustion reactions. Vinyl chloride was present fairly consistently in all of the samples. Studies conducted on detailed chemical structure of chlorinated hydrocarbon flames indicated that vinyl chloride is the predominant intermediate species produced during the early stage of the combustion, which leads to the formation of chlorinated aromatics during the latter stage of combustion." Lemieux et al., pp. 2134- 2135.

Even if the VCM incinerator operates at a destruction efficiency beyond the expectations of the project proponents, ample amounts of vinyl chloride and vinyl chloride radical will exist in the post-combustion zone to give rise to formation of substantial levels of PCBs and dioxin.

5. The EIA Lacks a "Life-Cycle Assessment" of PVC Impacts to the Environment

The EIA for the PVC plant limits its focus geographically (impacts on the environment in the vicinity of the proposed plant) and temporally (impacts during construction and operation phases). This ignores the totality of environmental impacts resulting from the manufacture and use of PVC by society. Most notably, the combustion of PVC (for example, accidental fires in buildings or vehicles containing PVC) is one of the single most significant sources of dioxin emissions. Lemieux, P.M. et al (2000) "Emissions of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans from the Open Burning of Household Waste in Barrels," ENVIRONMENTAL SCIENCE AND TECHNOLOGY (http://pubs.acs.org/hotartcl/est/2000/research/es990465t_rev.html.)

Recognizing these impacts, the European Union has called for a detailed life cycle analysis of PVC manufacture and use in Europe. (<http://europa.eu.int/comm/environment/pvc/>)

The proposed PVC plant will be the source of 170,000 tons per year of additional PVC to the environment of India.

6. The Environmental Action Plan for the PVC Plant Lacks a Leak Detection and Repair (LDAR) Program

Page 6-23 of the EIA contains a list of design standards that Chemplast would use to minimize fugitive emissions of VCM. Conspicuously absent from this list and the Environmental Action Plan for the PVC plant is implementation of a Leak Detection and Repair (LDAR) Program.

The U.S. EPA recognizes that, while proper design of equipment is essential for the control of vinyl chloride, even properly designed equipment will eventually leak. Therefore, the U.S. EPA requires operators of PVC plants to employ a rigorous program to detect and repair leaks of VCM, including weekly or monthly visual and physical inspections of valves and other equipment that may leak. 40 CFR Part 61, Subpart V - National Emission Standard for Equipment Leaks (Fugitive Sources). (<http://www.tnrc.state.tx.us/air/opd/61/V/vhp.htm>)

7. The Environmental Action Plan for the PVC Plant Lacks a Plan for Monitoring Actual VCM Emissions and Actual VCM Ground-Level Concentrations

While the Environmental Action Plan provides for the monitoring of emissions and ground-level concentrations of conventional pollutants (e.g., particulate matter, sulfur dioxide, nitrogen dioxide, etc.), inexplicably this plan does not require monitoring of emissions and ground-level concentrations of VCM, the single most hazardous air pollutant that the proposed PVC plant will emit. See EIA for PVC plant, page 7-10.

This is contrary to international monitoring requirements for PVC plants.

For example, the U.S. Environmental Protection Agency requires PVC plants to conduct continuous emission monitoring of VCM emissions. 40 CFR Part 61, Subpart F - National Emission Standard for Vinyl Chloride, Section 61.68. (<http://www.tnrcc.state.tx.us/air/opd/61/F/68.pdf>)

Other jurisdictions require continuous monitoring of ground-level concentrations of VCM in the vicinity of PVC plants. For example, under standards promulgated by the State of California South Coast Air Quality Control District, operators of PVC plants must:

"1) Provide and operate up to four air monitoring stations to continuously measure and record ambient concentrations of vinyl chloride in the vicinity of such plants. The exact number and location of such monitoring stations shall be approved by the Executive Officer; and
2) Provide and operate up to four additional air monitoring stations to continuously measure and record ambient concentrations of vinyl chloride in populated areas near such plants. The exact number and location of such monitoring stations shall be approved by the Executive Officer." South Coast Air Quality Control District, Regulation XI, Rule 1163 - Control of Vinyl Chloride Emissions (Adopted June 7, 1985). (<http://www.aqmd.gov/rules/html/r1163.html>)

8. The Environmental Action Plan for the PVC Plant Lacks a Contingency Plan for Responding to a Major Release of VCM

The purpose of an EIA is to provide essential information to government officials and communities about proposed projects, enabling them to decide whether the potential benefits of a proposed project outweigh its potential risks; and whether a proposed project could be implemented in a manner that minimizes its impact to the environment.

To fulfill this important purpose, an EIA must include a contingency plan that describes the measures the project proponent and relevant authorities would take in the event of an emergency situation.

In recognition of this principle, the Government of India's Ministry of Environment and Forests (MoEF) requires environmental management plans to include contingency plans for emergency situations. According to the MoEF:

"Preparation of environmental management plan is required for formulation, implementation and monitoring of environmental protection measures during and after commissioning of projects. The plans should indicate the details as to how various measures have been or are proposed to be taken including cost components as may be required. ... 12. Disaster Planning. Proper disaster planning should be done to meet any emergency situation arising due to fire, explosion, sudden leakage of gas etc. Fire fighting equipment and other safety appliances should be kept ready for use during disaster/emergency situation including natural calamities like earthquake/flood." (<http://envfor.nic.in/citizen/specinfo/emp.html>)

The EIA for the proposed PVC plant alludes to, but does not contain a disaster management plan. See EIA for PVC plant, page 6-6.

9. The EIA for the Marine Terminal Facility Lacks an Oil Spill Assessment

Accidental petroleum spills from ship traffic causes significant impacts to the environment. The risk of a petroleum spill is not limited to oil tankers or other vessels that specialize in the transportation of oil or fuel. The frequency of accidental releases of oil from cargo vessels is as great as from oil tankers. Talley, W.K. (2000) "Vessel Accident Oil Spillage: Post OPA-90," (<http://www.oduport.org/Talley2.htm>.) Every marine cargo vessel carries large amounts of fuel oil. Typically, marine cargo vessels use bunker fuel, a type of fuel oil that is especially dense and viscous and that can cause especially severe and long-lasting environmental impacts.

Chemplast proposes to construct a marine terminal facility to import 170,000 tons of VCM per year. As a consequence, numerous large ships will enter and leave the Cuddalore coast carrying many thousands of liters of transportation fuel and metric tons of chemicals. An accident involving any of these ships has the potential to release significant amounts of petroleum into the Cuddalore coast, spoiling productive fishing grounds.

The EIA for the Marine Terminal Facility contains no analysis of what would happen to the marine environment of Cuddalore if there were an accidental petroleum spill resulting from ship traffic to and from the proposed port facility. This is a significant omission considering that fishing is a common form of employment in the area.

The World Bank requires that proposed port facility projects evaluate the potential environmental impacts of such accidental spills. For example, the World Bank is assisting the Government of Mauritius to conduct an EIA for a port development extension project located in the port of Port-Louis. The terms of reference for the EIA require consultants to evaluate the environmental impacts of accidental petroleum and chemical spills from ship traffic. Environmental Impact Assessment in Port Louis (Mauritius) (http://www.worldbank.org/html/fpd/transport/ports/_tor/env-bas2.pdf)

10. The Environmental Action Plan for the Marine Terminal Facility Fails to Require VCM Vapor Recovery During Unloading

The proposed PVC plant will receive all of its VCM through the unloading of VCM from vessels to a pipeline.

According to Warren Johnson of the U.S. EPA (see above), emissions of VCM during the unloading of a single vessel can vastly exceed VCM emissions from a PVC plant that processes the VCM if the vessel is not equipped with an adequate vapour recovery system. In the U.S., vapour recovery systems are mandatory for vessels unloading bulk quantities of hazardous volatile liquids such as VCM. 40 CFR Part 63, Subpart Y - National Emission Standards for Marine Tank Vessel Loading Operations. (<http://www.tnrcc.state.tx.us/air/opd/63/Y/yhp.htm>)

Conspicuously absent from the Environmental Action Plan for the Marine Terminal Facility is a requirement that all vessels unloading VCM employ an adequate vapor recovery system.

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(This document expresses the opinion of its author and not necessarily the opinions of the U.S. office of the Environmental Law Alliance Worldwide or other individuals or organisations affiliated with the Environmental Law Alliance Worldwide.)

ANNEXURE II

EXISTING RESTRICTIONS ON THE USE OF PVC PIPE

World-wide Restrictions

Toronto, Canada

The City of Toronto adopted the following resolutions at their April 29 and 30, 1996 City Council meetings:

“Directed that only ductile iron pipe or concrete will be used for water lines installed in soils that are contaminated with substances, such as solvents or hydrocarbons, that can permeate through plastic or PVC pipe.”

“Requested the Acting Fire Chief to report on setting up dioxin residue tests for scenes of fires.”⁷

Slovakia

The Parliament of Slovakia voted on May 16, 2001 to pass a new Waste Management Act. This act was passed in order to reduce PVC waste, and it bans the production, import and export of all PVC products (including packaging) starting January 1, 2008.⁷
(The total ban has been repealed but other restrictions now apply. *)

Germany

Bonn - On December 13, 1995, the Committee for Environmental Issues of the German Capital City of Bonn announced a policy that would phase out most major uses of PVC in public construction.

Berlin - Over 130 building projects completed since 1989 have been built with restrictions on the use of PVC.

Hesse - PVC is allowed only if a recycling guarantee is given, the product has a high recycling content, it does not contain heavy metal stabilisers (in particular lead and cadmium) and the PVC-free product is more than 20% more expensive.

Aachen - In 1996 Aachen became the first community to include a ban on the use of PVC in cables.⁷

United Kingdom

In the UK, Anglian Water specifies polyethylene or ductile iron pipes in their program to renovate water mains. Also, for engineering reasons, they do not allow developers to use PVC pipe in new sewage schemes.

The UK gas industry now only uses medium density polyethylene (MDPE) pipe because it is more flexible than PVC pipe.

- PVC or packaging waste is in new Packaging law (No. 529 from 19th August 2002). Slovak Packaging law is active from the 1st January 2003. There are some directions from the part

“Prevention” (§ 3) of this law: - Who produces more than 10 tons of packaged products has to elaborate “Programme of Prevention”. This Programme must consist of quantitative targets for prevention, things how to achieve these targets and control mechanisms for confirming of fulfilling the targets.

- Who produces the packaging or goods made of PVC has to elaborate “Programme of Prevention” with steps for continuous decreasing and replacing PVC with other kinds of plastics or another materials.
- Boarding places (restaurants, snack-bars, refreshment rooms, cafés,) with permanent access to warm water using the one-way dishes are compulsory to elaborate programme of prevention with measures for gradual decreasing of one-way dishes and measures for replacing them with reusable dishes or dishes made of biologically degradable material.
- Programmes of prevention have to be elaborated for the period of 4 years. - Who is putting the drinks into circulation in packaging which are not returnable, is compulsory to put into circulation ALSO those drinks in RETURNABLE PACKAGINGS; if these drinks are also available in returnable packaging in market in Slovakia. This duty applies only for places with more than 100 m² of selling area.

United States of America

The State of New York

On February 20, 2001, the State of New York passed a senate bill (S2743, A4982) limiting the use of PVC pipe. These restrictions were placed on PVC use due to labour and environmental issues. The bill was passed as “an act to amend the labour law, in relation to establishing standards for plumbing materials and providing for uses of standard plumbing materials.” It went into effect on January 1, 2002, and it prohibits the use of PVC pipe in three- or more-family dwellings_and in multiple dwellings exceeding six stories in height.

Philadelphia, PA

Although the State of Pennsylvania has been urging municipalities to adopt a plumbing code that permits the use of PVC pipe for laterals in sewer work, the Mayor of Philadelphia, John Street, has decided against it. Philadelphia has recently updated all of their building codes but did not update their plumbing code.

The current plumbing code requires the use of cast iron pipe for underground sewer laterals. Since installing cast iron pipe is much more expensive than PVC pipe, the city provides interest-free loans to homeowners that are replacing their laterals.

Lake-in-the-Hills, IL

Although the village of Lake-in-the-Hills does allow the use of PVC pipe in wastewater piping and venting, it recently placed a ban on the use of CPVC in potable water distribution piping. Originally, the ban was placed on CPVC because of its lack of long term durability. When the village entered a lawsuit over the issue, it also looked into health issues and included them as reasons. One of the professional witnesses for environmental issues was from California.

Chicago, IL

Chicago amended their plumbing code on March 27, 2002. The new code further restricts the use of PVC pipe. PVC drainage pipes are no longer permitted above-ground in buildings over three stories in height and in buildings not intended for family occupancy. PVC pipes are also prohibited for use in underground building drainage and vent pipes, and in storm water detention applications.

Chicago has very strong labour unions and environmental groups, so it is likely that these restrictions were put in place partly due to labour and environmental issues.