The Indian People's Tribunal Report

IPT

On Environmental and Human Rights Violations, by Chemplast Sanmar and MALCO Industries at Mettur, Tamil Nadu







India People's Tribunal on Environment and Human Rights
July 2005

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THE INDIAN PEOPLE'S TRIBUNAL REPORT

On Environmental and Human Rights Violations by Chemplast Sanmar and MALCO Industries at Mettur, Tamil Nadu

Tribunal Headed By:
Justice Akbar Basha Kadri
(Retired Judge, Madras High Court)

Members:
Mr. Vijay Kanhere
Prof. Fatima Babu
Dr. P.A. Azeez

INDIAN PEOPLE'S TRIBUNAL ON ENVIRONMENT AND HUMAN RIGHTS
July 2005

Preface

Man is born free but fettered everywhere. Mettur, a small town with all its flora and fauna made fertile by river Kaveri was mostly an agricultural town. The agriculture gave way to industries. People of Mettur welcomed industries but it is appalling, how the industries have caused negative impacts in their lives. The air, water, soil and noise pollution caused by the industries have driven the villagers to run from pillar to post for redressal. But what they found was that the minds of the authorities and the industrial managers have become wooden. At last they have approached the Indian Peoples Tribunal, which has lent its hand in wiping their tears.

The panelists of the IPT toured Mettur for 3 days as a fact-finding committee. There was overwhelming response and tumultuous welcome. The villagers extended their at most cooperation and came forward to give voluntary statements. The Tribunal examined the grievances of hundreds of villagers. It was saddening that none of the management personnel of the industries and important Government officials who are at the helm of affairs turned up at the enquiry indicating that they are least interested in the welfare of the citizens. The Tribunal noted the appalling conditions of the villagers who are suffering physically, mentally and financially. After giving a deep consideration the Tribunal has prepared its report making suggestions for the betterment of the residents in and around Mettur. We hope the Government, the concerned authorities and the industrialists would go through the report and do the needful to alleviate the sorrows and sufferings of hapless people.

Sd/-
Justice Akbar Basha Kadri,
Chairman,
IPT Panel.

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19. SEED, Mettur
20. Shweta Narayan, Chennai
21. Tamilnadu Environment Council
22. Tamilnadu Green Movement
23. VRDP, Salem
24. West Gonur Farmers Welfare Association
25. Workers of Chemplast and MALCO (names withheld on request)

Contents

Executive Summary

The four-member multidisciplinary panel of Indian Peoples Tribunal, headed by Justice (Retd) Akbar Basha Kadri enquired into the alleged environmental and human right violations committed by two of the major polluting industrial units of Mettur in Salem district of Tamilnadu state. The panel conducted field visits and public hearings, and received several hundreds of written and oral depositions from local people and concerned officials. The present report describes the appalling scenario prevalent in Mettur – of indiscriminate disposal of hazardous wastes and the resultant devastation of environment and public health at Mettur. The report also brings to light the apathy and callousness with which the concerned authorities and government and industry officials dealt with the pollution related complaints and issues.

The Panel enquired specifically into several alleged environmental and human right violations by Chemplast Sanmar and MALCO Ltd at Mettur. Chemplast Sanmar's factories, including the PVC plant, were found to be responsible for polluting the water and soil of the area. Also, toxic effluents from Chemplast are being discharged with the consent of the TNPCB into the River Kaveri. The company has dumped toxic wastes – including mercury-bearing sludge and EDC/VCM tars from PVC production in pits. This has led to serious contamination of groundwater, and this contamination is spreading.

MALCO Ltd's Red Mud dump on the banks of the Stanley reservoir present a serious threat to Tamilnadu's water security. With heavy rains, the mountain of toxic Red Mud can enter the Stanley Reservoir and silt up the structure.

The Panel heard from and met several ex-workers from Chemplast and MALCO and community residents who are suffering a range of serious health problems. None of them have got even what little is legally due to them. Negligence on this count lies squarely with the regulators – the Pollution Control Board, the Factories Inspectorate and the District administration. In particular, the Panel was pained to see the plight of Samy Velu, a one-year old boy, who was exposed to a serious chemical release from Chemplast's chlorine plant on 18 July, 2004. Samy Velu was 22 days old at the time of the incident. He is still suffering, and his parents are hard-pressed to come up with the money for medical expenses.

The Panel came across overwhelming evidences to come to the conclusion that the toxic hazardous wastes and other emissions and effluents from the above mentioned industries have seriously impacted the ecology, human and animal health, agriculture, livelihoods and socio economic status of Mettur.

The panel has recommended immediate remedial action, including provision of clean water for the communities, initiation of health monitoring and remediation, and the constitution of a Local Area Environment Committee including local representatives to oversee pollution-reduction and remediation of contaminated sites, the removal of the MALCO Red Mud dump from the banks of Stanley Reservoir.

General Introduction

The Indian People's Tribunal

The Indian People's Tribunal on Environment and Human Rights (IPT) was formed on June 5, 1993, to conduct fair and credible investigations focusing on issues concerning human rights and environmental justice. Positioned as an alternative People's Court that gives voice to the struggles of grass-root organizations and affected communities, IPT conducts investigations on issues concerning human rights and environmental justice.

IPT works through a large network of judges, lawyers, human rights activists, and NGO's to help movements bring their local issues to the national and international platform. IPT also endeavours to strengthen the processes of local governance and democracy, and strives to highlight human rights and environmental violations by both state and private parties with the goal of seeking redressal and policy change.

The Mettur IPT Panel

Chairman: Justice Akbar Basha Kadri

Born in 1939 at Namakkal, a town in Tamil Nadu. Obtained his law degree from Madras Law College in 1964. Got first rank in Madras University in Law studies and was awarded five Gold Medals and four prizes. Enrolled as an advocate in 1964 and practised in the District court, Salem. In 1970, was appointed as District Munsif. Promoted as Sub Judge in 1979 and as District Judge in 1987. Finally elevated as a Judge of the High court of Judicature, Madras in July 1997. Served as a High Court Judge for more than four years and retired in August 2001. Currently, spending time in social service.

Panel Members

Mr. Vijay Kanhere

Vijay Purushottam Kanhere, Science graduate from Bombay University. Obtained his law degree in 1998 from Bombay University. He is one of the founder members and coordinator of the OHSC, Mumbai, a centre established by unions, lawyers, doctors and researchers in 1988. Areas of work includes medical check-ups of workers, research on occupational health; preparing material for doctors and workers, serving as resource person for doctors and workers trainings. He has authored various publications on Occupational health issues, and worked with diverse groups such as rural toilers and activists, urban people, workers and unionists, researchers and doctors

Prof. Fatima Babu

Prof. Fatima Babu is a College Professor by profession and is an eminent Social Activist associated with various campaigns of social concern such as Social Justice, Human Rights, and anti-corruption. She has been associated with various institutions such as Veeranganai, CARITAS, TASOSS, Fempower Foundation and FIMCOTNP. She is also a recipient of Outstanding Women awards from Pearl City Jaycees, Nagercoil Lioness', and Tuticorin Dt. Administration. She has also received Greenpeace International's award for her "ceasless efforts to protect the Planet's environment."

Dr. P.A. Azeez

Dr P.A. Azeez is presently the Senior Principal Scientist and Head of the Environmental Impact Assessment Division at Salim Ali Centre for Ornithology and Natural History (SACON), Coimbatore. He is an Environmental Chemist with research interests in related fields such as environmental pollution, environmental management, sustainable development and environmental economics. Dr. Azeez has undertaken studies of a number of industrial, hydroelectric and other projects with large-scale environmental and socio-economic implications.

1 Background

In February 2005, West Gonur Farmers Welfare Association – a Mettur-based community group – along with voluntary groups from Tamilnadu petitioned the Indian People's Tribunal to visit Mettur and conduct an investigation. The groups allege, among other things, that rampant industrial pollution in the area has laid waste their lands, water and health.

The Complaints

Years of negligent waste handling and the inherent unmanageability of the toxic pollution generated by the industries have contaminated groundwater sources and lands and harmed public health. Given that the companies have been discharging their effluents into the river, river quality and the fish resources in the river and reservoir are being affected.

Local people report a pronounced hostility from the district administration, police, industry, and government regulators towards villagers who raise the matter of pollution related damages.

As a result, the frequent incidents of intense pollution (of water or air) go unreported and do not attract any regulatory attention. Victims of pollution complain that they are neither compensated as per law, nor are their medical needs addressed.

Given the lack of initiative from the regulators – the Pollution Control Board and the Factories Inspectorate – in understanding and resolving the problems faced by communities and workers in Mettur, no efforts have been made to take stock of the problem. More dangerously, say the locals, the State has allowed the chemical units to discharge their toxic effluents into a waterway that provides drinking water for millions of people.

Villagers claim that the companies in the region deal with resistance to pollution and claims of damage-related compensation by portraying villagers as liars, by dividing the village by awarding contracts to influential people, and by harassment of its workers and community members. They also report that the companies tend to cut off the drinking water supply to communities that protest too much. MALCO and Chemplast are currently supplying some of the communities whose groundwater sources have been rendered unusable because of the pollution from these industries.

Villagers also allege that the police and the district machinery are controlled by the companies, particularly Chemplast Sanmar, and are reluctant to act on the complaints of local people.

The West Gonur Farmers Association is an organisation representing farmers and residents of Gonur, one of the villages affected by Chemplast's pollution. Tamilnadu Green Movement is a public interest organisation with volunteers and environmental enthusiasts throughout Tamilnadu. SEED is a Salem-based organisation engaged in environmental education among youth. Tamilnadu Environment Council is a collective of nearly 500 TN-based NGOs working on issues of environmental degradation and equity. Community Environmental Monitoring (CEM) is a Chennai-based campaign to assist communities in environmental monitoring, documentation, reporting and action taking.

The Terms of Reference

The terms of reference of the present IPT enquiry was to enquire into the following specific allegations made by the people

Chemplast Sanmar Industries has –

- Indiscriminately disposed toxic wastes in and around the factory site

- Contaminated the groundwater and rendered numerous wells and borewells unusable
- Downplayed serious pollution incidents, and exposed residents to hazardous incidents
- Contributed to the contamination of the River Kaveri with chlorinated effluents and mercury
- Placed millions of people at risk of long-term effects due to the consumption of contaminated water, fish and other food raised using the contaminated Kaveri water;
- Exposed its workers to unsafe work conditions, and failed to address their occupationally-induced health problems.
- Laid claim to substantial quantities of the reservoir water despite the latter being earmarked for drinking and irrigation purposes.

MALCO Industries has -

- Stored "Red Mud" waste on the banks of the Stanley Reservoir thereby threatening the water security of millions of people.
- Failed to address complaints of local people relating to livestock injuries due to "Red Mud," dust pollution during summers, and red-mud runoff to the river during wet season.
- Contributed to pollution in the area.

The organisation invites the Indian People's Tribunal on Environment & Human Rights to visit Mettur Dam and investigate the above allegations.

Legal Framework of Enquiry

A number of environmental laws, rules and regulatory mechanisms, including some that deal specifically with industrial pollution and hazardous industries, provide the framework for protection of environment, public health and occupation related human rights. 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,
14. Public Liability Insurance Act, 1991,
15. Rules for Emergency Planning, Preparedness and Response for Chemical Accidents, 1996 (EPA),
16. General Penal laws and acts,
17. Factories Act,
18. Tamilnadu Factories Rules,
18. Boilers Act,
19. ESI.

The Ministry of Environment & Forests set up the Tamilnadu Loss of Ecology Authority pursuant to the Hon'ble Supreme Court's decision on the Vellore Citizens' Welfare Forum v. Union of India (1996) 5 SCC.647. The

authority was empowered to assess and disburse compensation to victims of pollution, and order remediation of environmental damage at the cost of the party responsible for the pollution.
In the same case, the Hon'ble Supreme Court also declares 'Polluter Pays' and the 'Precautionary' Principles as integral features of "sustainable development" and defines them as follows:

Polluter Pays Principle: ". . .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, the Supreme Court opines.

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 "absolute liability for harm to the environment extends not only to compensate the victims of pollution but also of restoring the environment degradation."

Constitutional Guarantees

The Constitution of India also accords overarching guarantees relating to environmental quality. Article 21 guarantees Right to Health and Right to Clean Environment as part of the fundamental Right to Life. Art. 47 of the Constitution requires the State to improve public health as one of its primary duties. 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. Art. 51-c, requires the State to foster respect for international law and treaty obligations.

India is party or signatory to a number of international environment and human rights 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.[1]

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

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.[2]

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."

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.

Section 41(b) of the Factories Act requires factory management to disclose to their workers and neighboring residents details about the hazardous material and processes and hazards used in or posed by their operations.

About Mettur

Mettur Dam is a small town located on the sides of a gorge through which the River Kaveri, Tamilnadu's lifeline, enters the state. The Dam, one of the earliest in the country, forms the Stanley Reservoir which has a command area of 1,30,000 hectares and can generate upto 40 megawatts of electricity. The Mettur Tunnel powerhouse adds another 200 MW capacity.

The River Kaveri runs through Krishnagiri, Dharmapuri, Salem, Namakkal, Trichy, Thanjavur and Nagapattinam districts before emptying itself into the Bay of Bengal. Kaveri features prominently in the religious beliefs and local mythologies as a holy river. It is a major source of drinking water and irrigation, particularly in the fertile delta regions on Thanjavur, Trichy and Nagapattinam.

In the last several decades, the river is at the centre of a seasonal feud between the states of Tamilnadu and Karnataka over water-sharing. Tamilnadu, the downstream state, has a longer stretch of Kaveri flowing through its territory. Karnataka hosts the majority of the watersheds that contribute to the perennial build-up of water in the river. Tamilnadu, the downstream state, claims Karnataka is withholding TN's fair share of water.
That does not appear to be the only stress on Kaveri's waters. Stretches of the Kaveri rank alongside "Chennai city water ways. . .Noyyal" as the "most polluted zones of the State," according to a Tamilnadu Government report.[3]

[2] GO Ms. No. 340, Health and Family Welfare Department dt/19 February, 1982
[3] "State of Environment of Tamilnadu" Dr. S. Balaji, IFS. Department of Environment, Government of Tamilnadu. Undated. Released in 2005

The Government report cites a recent Tamilnadu Pollution Control Board (TNPCB) survey to highlight that 1100 industries operate in the Kaveri basin. The estimated wastewater discharge is 162000 m^3 per day. Out of that, 87000 m^3 per day is discharged directly into the Kaveri. Salem district, at 63996 m^3 per day, followed by Trichy or Tiruchirappalli (5764 m^3 per day) are the largest contributors of effluent water into the Kaveri, according to the Government report.

"In 1998, the Govt. imposed a ban on setting up of the specified 14 categories of highly polluting industries within 5 km from the important water sources of rivers Cauvery and its tributaries, Ponniyar, Palar, Vaigai and Thamirabarani," the State of Environment report notes.

Industries in Mettur

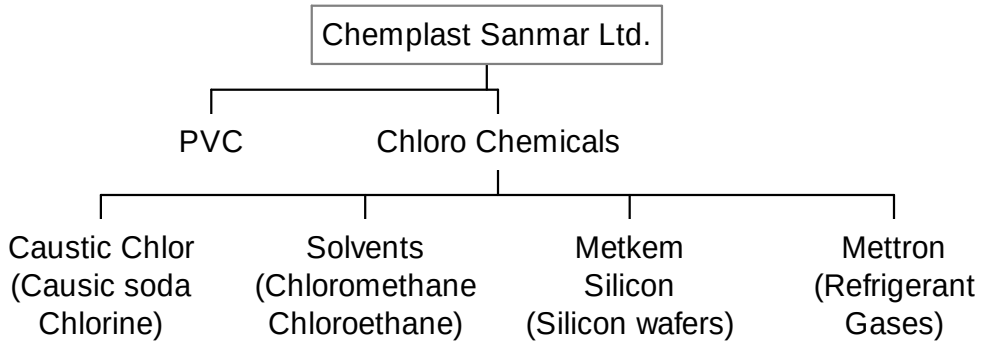
Industrialisation in Mettur began in 1936 when Mettur Chemicals set up India's first caustic-chlorine factory above the Stanley Reservoir. In 1965, the Madras Aluminium Company set up a refinery-cum-smelter near the reservoir. The Mettur Thermal Power Station (MTPS), also located here, is one of four major thermal plants in the State with an installed capacity of 840 megawatts.

Today, despite the small-town feel given by Mettur Dam, the town is indeed an industrial hub housing a disproportionately high concentration of polluting industries. Detailed information on the chemical pollutants arising out of Mettur's industries is included as Annexure 1.

Among the first things that greet the Kaveri as she enters Tamilnadu is the toxic effluents from more than half a dozen major industrial operations – including four units owned by Chemplast Sanmar or its affiliates, one owned by MALCO and two thermal power plants owned by MALCO and the Tamilnadu Electricity Board.

The units belonging to Chemplast Sanmar and its affiliates, and MALCO are the subject matter of this report.

Chemplast Sanmar Ltd, its subsidiaries and joint ventures



Plant I: Hydrofluoric acid plant. Not in operation

Plant II: 60,000 tonnes per annum of PVC.
Set up in 1967 with technology from B.F. Goodrich, the PVC plant converts industrial alcohol to ethylene and subsequently to ethylene dichloride (EDC). EDC can be produced by direct chlorination of ethylene or by oxychlorination of ethylene wherein the latter is reacted with dry hydrogen chloride. EDC is then subjected to high pressures and temperatures to crack it to yield vinyl chloride monomer and hydrogen chloride. The recovered hydrogen chloride is fed back into the oxychlorination cycle. The combination of direct chlorination with hydrogen chloride recycling (through oxychlorination) is referred to as the "balanced process."

Ethylene feedstock -industrial alcohol- is supplied by Chemplast's factory at Panruti. A factory in Krishnagiri was closed amidst complaints of pollution.

According to Chemplast Sanmar's website, the plant manufactures "a variety of high-quality PVC resin products" including battery separator resins, copolymer resins, suspension resins, and paste resins.

The hydrogen chloride recycling process is supplied by NOCIL.

Plant III: Caustic soda, chlorine (using mercury cell process), chloromethanes including Carbon Tetra Chloride, methylene chloride and Trichloroethylene.

The caustic soda plant was set up in 1936 by the Mettur Chemicals and Industrial Corporation Ltd, and merged into Chemplast Sanmar in 1988.

Mettron, the division that manufactures chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) commenced operations in 1988.

The Solvents division manufactures chloromethanes, chloroethanes and silicon products. The company website declares that the Solvents division "exports many products including chloroform, methylene chloride, trichloroethylene, tetrachloroethane and ethyl silicate."

In 1997, the company enhanced the production capacity of chloromethanes from 11,000 tpa to 22,000 tpa.

Plant IV: Metkem Silicon Ltd. Silicon plate (used as insulation for electricity)
Since 1982, Metkem Silicon has produced hyper-pure polysilicon. Annual production capacity is 25 tonne per annum. The company website claims that the plant can produce up to 2 million silicon wafers for use in semiconductor and photovoltaic industries.

Plant V: Cabot Sanmar Ltd. Fumed silica (700 tonnes)
The company is a joint venture between Cabot Corporation of the US and the Sanmar Group. Since 1998, they manufacture colloidal silicon dioxide and fumed silicon dioxide at the Mettur plant.

Thermal Power Plant:
In 1998, Chemplast achieved self-sufficiency for power after it augmented its captive thermal power generating capacity to 40 megawatts.

MALCO Ltd.

Set up in 1965, the Madras Aluminium Company Ltd has a production capacity of 35,000 tonnes per annum of Aluminium. Between 1992 and 1995, the company closed due to power shortages. In 1995, Malco merged into Sterlite – a Vedanta-group company. Production resumed after significant investments, including the addition of a 75 MW captive power plant.

The refinery-cum-smelter can turn out 60,000 tonnes per annum of alumina and 35,000 tonnes of Aluminium. Bauxite for the factory comes from the company's captive mines in Kolli Hills, Yercaud and Palni Hills.

Hazardous Material and Waste Handling at Mettur

Chemplast Sanmar

Waste: The company legally discharges effluents from at least two plants into the old riverbed of Kaveri, at a point about 1 km from the current course of the river. The discharge point is located near Thangamapuripatnam village. A number of water intake points operated by TWAD board are present in the area immediately downstream of the discharge point.

Locals report that the company also discharges liquid effluents through a *kaalvaai* (stream) that eventually reaches the Kaveri in the vicinity of the legal discharge point.

Chemplast claims it discharges effluents that are treated in its ETPs to required levels of compliance by the Central Pollution Control Board norms.

Chlorinated wastes and solvents are burnt in a dedicated incinerator onsite. Dioxin-rich tarry wastes generated during EDC and VCM production have also been reportedly buried in unlined pits onsite.

Mercury bearing brine sludge is reportedly immobilised and buried within the premises in unlined pits, and capped from above with a concrete covering.

Material: Until recently, salt for the caustic chlorine unit was stored in the open or under a wall-less shed.

Cell-house workers reportedly collect spilt mercury in the caustic-chlorine plant with bare hands.

MALCO

Waste: The company discharges its effluents into evaporation ponds within its facility.

Large quantities of Red Mud are dumped on village lands and the banks of the Stanley Reservoir. The deposits are separated from the High Water Level of the reservoir by an embankment that also serves as a *kutcha* road. The dump site is openly accessible from virtually every direction.

Material: Coal for MALCO's thermal plant is transported by conveyor belt from the Mettur Railway Station. The Conveyor belt runs over people's residences and public thoroughfares.

2 IPT Enquiry at Mettur – When, Where and How

The IPT panel spent three days in Mettur, from 29 April to 1 May 2005. Besides spending a day visiting various pollution hotspots in Mettur, the IPT panel also interacted with villagers at or outside their homes. On 29 April, the panel also visited the MALCO red mud dumping area on the banks of Stanley Reservoir, and Chemplast's mercury waste burial site behind the company's residential quarters.

On 30 April and 1 May, the panel invited public depositions and representations from industry and various Government bodies. Invitations were extended to the following:
a) Management and workers of Chemplast Sanmar
b) Management and workers of MALCO Ltd
c) Panchayat leaders
d) Government offices, including District Collector, Police, TWAD, TNPCB, Agriculture and Health departments, PWD, ESI and Factories Inspectorate

29 April, 2005:
The Tribunal visited pollution hotspots including:
MALCO red mud dumpsite
Chemplast Sanmar's legal discharge point at Thangamapuripatnam.
Ajaya Nagar, Periyar Nagar, Kolipannai, New Kunjandiyur
Chemplast's mercury-bearing brine sludge waste burial site

30 April, 2005:
Public hearings at:
Govt School, Kunjandiyur, V.K. Pudur Panchayat;
Town Panchayat Office, PN Patti Panchayat;
Periyar Reading Room, Thengalvarai/Ramamoorthy Nagar;
Opp. MALCO Gate, Mettur R.S.

1 May, 2005:
Public hearings at:
Mariamman Koil (Vellakalmaduvu);
At Ration shop, Mottur

Meeting with Government and Company management:
Samathuvapuram Community Hall, Mettur-Salem Road

At least 600 villagers belonging to Gonur, Thippampatti, Karumalaikoodal, Thengalvarai, Ajaya Nagar, Panangadu, Kunjandiyur, New Kunjandiyur, Rettaipulliamaram, Sri Nagar Colony, Kamaraj Nagar, Raman Nagar, Saralaikadu, Pudu Sampalli, Veerakalpudur, Komburangadu, MALCO Nagar, P.N. Patti, Kampayikadu, Ramamoorthy Nagar, Bharathi Nagar, Thangamapuripatnam, N.S.K. Nagar, Desai Nagar, Periyar Nagar, Mettur R.S, Kolipannai, Kolipannai, Puduvelamangalam, Veeranur, MGR Nagar, Pudusamballi and Mottur deposed before the panel. The panel received 489 written depositions, some of which were first deposed orally. Not all oral depositions were accompanied by written testimonials. However, every person that deposed at the public hearings was registered.

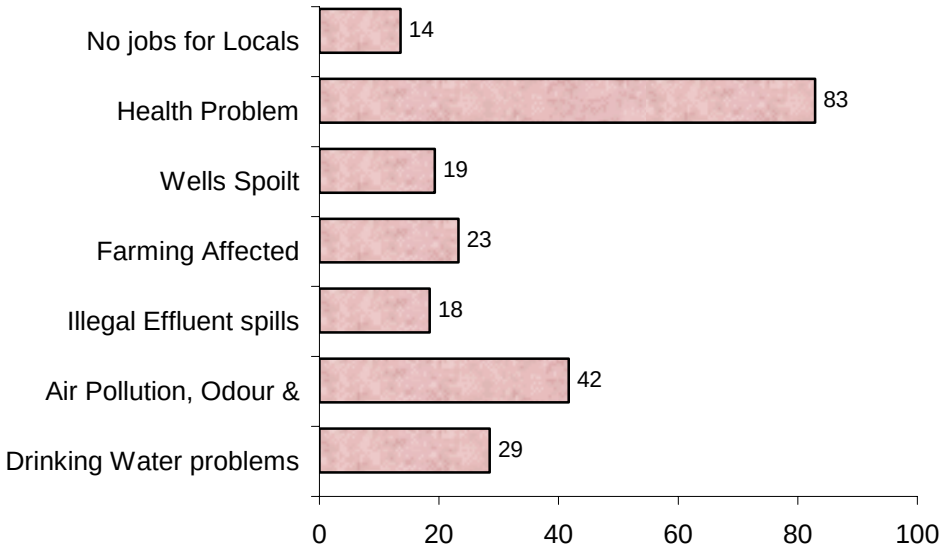


Figure 1: Percentage of local people who testified about various problems (Total = 227)

Representatives from Chemplast and MALCO did not attend. Officials of Tamilnadu Pollution Control Board, PWD, Factories Inspectorate, District Collectorate, Police or ESI also did not attend.

Dr. Soundarajan, Deputy Director, Health Service (Public Health); Mr. A. Arunachalam, Asst. Director Statistics (Public Health); R. Annamalai, Exec. Engineer, TWAD Board; N. Shanmugam, Asst. Executive Engineer, TWAD Board; Dr. K. Poongodi, Medical Officer, and S. Thiraiseelan, Block Health Supervisor, Dept of Public Health, Nangavalli Panchayat attended and made oral representations.

G. Madhappan, Secretary, Sanmar Workers Union – Plant 3; I. Ramasubban, Chemplast Labour contractor; and M. Kalaivasu, M. Selvarasu, and K. Shanmugam, Plant IV Employees Union presented three spiral-bound volumes said to contain the statements of Chemplast workers and residents living around the factory.

No trade unions from MALCO attended, although a number of workers testified independently as residents.

Complaints and Evidence Against Chemplast Sanmar

Indiscriminate disposal of Industrial wastes

Solid Hazardous waste

According to local reports, Chemplast disposed extremely hazardous wastes in open, unlined pits within its premises. About 90 pits of varying sizes containing "immobilised mercury bearing brine sludge" dot the Western side of the company.

The IPT panellists inspected the site. One pit was partially filled with white lime-like sludge. It was open to the elements. What appeared to be plastic liners for the "landfill" were damaged, especially along the top compromising the integrity of the liner system. Holes in the liner allow water to enter the landfill, and leach the chemicals out of the stored sludge into the surrounding groundwater table.

Another 12 wells inside the PVC plant reportedly were used as dumps for years worth of EDC and VCM tars.[4]

[4] A. Mani. Farmer, Thippampatti Kattuvalavu, Gonur Panchayat. Deposition to IPT panel. 29 April, 2005.

A. Mani, a farmer from Gonur Panchayat, says "All this dumping is the reason why, on the North side, groundwater upto 15 km will be damaged. Already, the pollution has moved to 10 km. Within the first kilometre, the damage to wells is 100 percent. The water smells of carbon tetrachloride, alcohol. It has a strong smell, and if you use it, the skin itches and hair falls and you'll have dental problems – yellow teeth. Even cattle will not drink this water. We can't even use it for toilet purposes."

On the eastern side, Mani reports, that a salt godown, where salt was stored on bare ground led to salinisation of groundwater. "Just on the Southside, in PN Patti and Veerakalpudur, the wells are totally spoilt. About 400 wells," he says.

Water Pollution

Three common areas complaints were received on water pollution and related effects. One slough of complaints had to do with health effects and drinking water contamination due to a smelly effluent stream running alongside houses in Karumalaikoodal and Ajaya Nagar areas. The second involved the wasting of agriculture in Kunjandiyur and similarly located areas due to highly saline effluents from Chemplast. The third involved the complaints and evidence relating to Chemplast's legal effluent discharge points into the Kaveri at Thangamapuripatnam.

Effluent Stream

Residents living alongside Chemplast's unauthorised effluent channel to Kaveri complain that the toxic water overflows onto their streets, and sometimes into their homes, and that the noxious vapours from the stream result in numerous health problems.

Indeed, during the IPT panel's visit to Ajaya Nagar, Kampayikadu and Karumalaikoodal, many people attributed a litany of health problems to the smelly effluents. The effluents, they say, are stored within Chemplast's premises and discharged a little at a time during nights, or in bulk during rains.

"My house is on the side of the stream that is used for effluent discharge. Even with the slightest rains, the company releases a lot of the wastewater. We have to wait until the water subsides to move around. There are a lot of health problems – wheezing, ulcers," says 45-year old G. Rajamani of Karumalaikoodal. Allergies, stomach disorders, hysterectomies, menstrual disorders, wheezing, tumours, and skin and dental problems were commonly reported by residents both during the IPT's visit to the sites and at the public hearings.

"I live near the effluent stream. When the water rises, it runs by our doorstep. Whenever this happens, we get breathless. I develop an allergy. There is a strong rotten egg smell. Four to five years ago, one man was washed away by the effluents," says K. Govindaraj, a 29-year old man from Karumalaikoodal.

P. Ashok, a 25-year old from Karumalaikoodal, says the stench from the effluent stream is unbearable. "It becomes impossible to live whenever the effluents are discharged and when this happens, we just have to take our infants and run out. I am suffering from giddiness for the last 4 years. I have lost my appetite. When we smell the vapours, it harms us. And 12 of our wells are contaminated for the last 8 years. It has an oily film on it," he says.

Chemplast Sanmar Workers Union Secretary G. Madhappan denies Chemplast's hand in the polluted water. "The water in the canal running via Karumalaikoodal is not Chemplast's water. It is sewage from the households."[5]

However, IPT's visit to the effluent stream left it with no doubt that the effluents are of a chemical nature rather than biological as asserted by Sanmar union leader Madhappan. IPT was able to confirm people's claims that the

[5] G. Madhappan. Secretary, Chemplast Sanmar Workers Union – Plant 3 union. Deposition to IPT panel. May 1, 2005

streamwater had a strong, and sometimes overpowering organic chemical odour, and that it was running black and frothy.[6]

Legal Discharge into Kaveri

Residents from Periyar Nagar and Thangamapuripatnam complain of the smell and pollution caused by both the illegal effluent stream, and the legal discharge into Kaveri. On April 5, 2005, Chennai-based Community Environmental Monitoring took an air sample from the vicinity of Chemplast Sanmar's effluent discharge point in the River Kaveri. The sample was analysed by the Columbia Analytical Services Laboratory in California, for 69 volatile organic compounds and 20 sulphur compounds (Annexure 3).

An air sample, rather than a water sample, was taken because many of the chemicals discharged by Chemplast's PVC and chloromethanes unit tend to volatilise from water. An air sample taken above the effluent discharge point would capture the volatile and odourous compounds released from the effluents. The chemicals detected can be safely assumed to be present in the water – which is the source of the air emissions. Also, the levels in air would be a conservative estimate of what is present in water.

The analyses reliably identified 17 chemicals, including 15 VOCs and 2 sulphur compounds, and tentatively identified 9 compounds. At least four of the compounds found are manufactured in one or other Chemplast units. These include: vinyl chloride, ethylene dichloride (1,2-Dichloroethane *aka* EDC), methylene chloride, chloroform. All four are confirmed animal and/or human carcinogens. EDC was found at levels 32,000 times above US Environmental Protection Agency's Region 6 screening levels. Vinyl Chloride was roughly 2100 times above the same levels. Screening levels are levels above which health effects may occur. Hydrogen Sulphide (a gas that smells of rotten eggs) was nearly 400 times above safe levels. (See Table "Chemicals Detected in Air Sample Above Chemplast Effluent Discharge Point, Mettur.")

In a written deposition to the IPT, CEM researchers report that "Our visit to the area revealed that more than 2km of the river was severely polluted. This was evident from the intense organic odour in the vicinity of the river. Prolonged exposure to the odours caused dizziness and a light-headed feeling."[7]

CEM records that "The effluents collect in rock pools on the river bed. Water in the stretch immediately downstream of the effluent discharge point is foamy near the rapids, and dark black in the pools. There was no visible sign of fish life in these pools. A strong smell of rotten eggs was evident here. Further downstream, the water was more transparent, and tilapia fish were observed."

The air sample revealed that the high levels of hydrogen sulphide may partially account for the rotten egg odour. Dr. Mark Chernaik, staff scientist at US non-profit group ELAW-US, reviewed the results of the Chemplast air sample.

"The high levels of hydrogen sulfide (H_2S) in samples of air above the effluent stream is a very stong indication that there is very little dissolved oxygen in the effluent. This is a strong indication that the effluent contains high levels of biochemical oxygen demand (BOD) that Chemplast is failing to treat. That is, when a polluter discharges high levels of BOD into a stream, it depletes oxygen levels in the stream and promotes the conversion of sulfur compounds (including sulfate) into H2S, which evolves from the stream as a gas," according to Dr. Chernaik.[8]

[6] IPT visit to Ajaya Nagar. 29 April, 2005
[7] Nityanand Jayaraman & Shweta Narayan (Community Environmental Monitoring). Written deposition submitted to IPT. 28 April, 2005
[8] "Opinion and Interpretation of Results of Air Sample Collected Above Chemplast Sanmar's Effluent Discharge Point in River Cauvery, Thangamapuripatnam, Salem District." Dr. Mark Chernaik, Staff Scientist, ELAW-US. 28 April, 2005

"If you were to analyze BOD levels in the effluent, they would most likely be excessive - probably well above the limit of 100 mg/L set out for the Organic Chemicals manufacturing industry in Section 68 of Schedule 1 of Rule 3 of the Environment (Protection) Rules," he notes.

On 24 November, 2004, massive fish deaths downstream of Chemplast's effluent discharge point was hushed up by the district authorities without any punitive action against Chemplast. According to Chemplast workers, the company had cleaned the monomer plant and discharged the effluents two days prior to the fish dying. The Tamilnadu Pollution Control Board drew samples from the site of the incident. Analytical results revealed that the water had no dissolved oxygen. However, the Pollution Control Board failed to go behind the reasons for the drop in dissolved oxygen in river water.

Since then, three other similar incidents have happened, the most recent in late June 2005.

A fish diversity study conducted by Dr. M. Arunachalam, an expert in the ecology of lakes and streams, and Dr. M. Muralidharan confirmed local complaints that the stretch of Kaveri immediately below Stanley Reservoir is seriously degraded.[9] [See Annexure 2]

A histological analysis of fish tissue in samples of *Etroplus maculatus (Pearl Spot)* and *oreochromis mossambica* (*Tilapia*) collected downstream of Chemplast's discharge point found changes and damage to gill, kidney and intestinal tissue. "In fishes exposed to pollutants like mercury and arsenic, these changes are evident," the authors report.

Poisoned Wells

Complaints, particularly from Veerakalpudur and Gonur Panchayats, indicate that effluents discharged through open streams, routine and continuing discharges during rains, and the leaching of contaminants from effluents allegedly stored in earthen ponds inside the factory have rendered open well and borewell water useless for agriculture or other purposes.

Out of 227 recorded oral testimonies, at least 20 percent reported problems with well-water contamination, and 23 percent indicated that agriculture had suffered as a result.

Complaints of pollution from Mettur Chemicals (Chemplast's name under the previous ownership) began surfacing in the early 1960s. At that time, the company discharged its effluents to the Kaveri through private lands in the villages.

K. M. Ardhanari's farm in Kunjandiyur New Colony lies alongside an *odai* (stream). "Our land was good. We used to get 25 bags of rice per acre before the water got spoilt. Every year, the *odai* would wash in fresh silt onto our land. We didn't have to irrigate our land; the paddy would grow fed merely by the springs," says the 86-year old farmer.

"In 1964, the company started. I didn't know what they manufactured. We live half a kilometre from the factory. We were fearful that the company will destroy our agriculture, and told them so. The assured us that we'll all benefit. "You are lucky," they said. "Our effluents will not affect your farming. Rather, you can raise three crops using our water." They guaranteed us. We believed them. Within six months, all downstream wells got saline," Ardhanari recalls.

[9] M. Arunachalam & M. Muralidharan. "Histological study on kidney, gill and intestine of two species of fishes collected from the confluence of effluent discharge from Chemplast Sanmar Group of Companies with the Cauvery River." Sri Paramakalyani Centre for Environmental Studies, July 2005.

He recalls: "We were opposed to the setting up of the plant. But they said 'You're lucky. The effluents will allow you to raise three crops.' We believed them and allowed the plant to set up. That year we had our ragi ready to harvest. In one night, all our ragi was destroyed. We protested. They started threatening us. We did strikes, fasts. My father went without food for 10 days. Finally, the collector intervened and brokered an agreement for compensation and employment for one person per contaminated well."

A letter by Mettur Dam RDO V. Chockalingam dated 10 September, 1966, requests Mettur Chemicals to ". . .also take expeditious steps to completely bale out the polluted water in the affected wells." That was in 1966. Barring a one-time compensation that some farmers received, the contamination problem has remained unaddressed.

Unofficial figures place the number of contaminated wells in the hundreds. According to Ardhanari, at least 85 wells were contaminated in 1966-67. Since then, the company has discharged its effluents within its site. But given the considerable spring water flow downhill of the factory towards the Kaveri, the contamination of downstream wells has only increased as the pollution plume has spread river-wards.

The IPT panel also visited many of the wells that were reportedly contaminated. Many of the wells, such as in Kolipannai and Thippampatti, gave off a strong smell of chemicals, and others were brackish and completely unusable. It appears that the groundwater in Gonur, Thippampatti-Kattuvalavu, Karumalaikoodal, New Kunjandiyur, Panangadu, Saralaimedu, Komburankadu, Veeranur and Mottur is completely contaminated.

The Chemplast representatives were not available for clarification.

Air Pollution

Air pollution, noxious emissions, chlorine leaks including serious incidents involving injuries and hospitalisations, and soot emission from the factory's captive thermal power plant are the subject matter of many complaints. At least 40 percent of the 227 people who testified orally before the Tribunal noted air pollution as an issue. Many of these complaints were related to MALCO's operations as well.

A. Pandurangan of New Kunjandiyur recalls that "In 1989, there was a chlorine gas leak. We ran away. The company gave us onions and buttermilk as an antidote. In 1992, I could not escape. I got caught in the smoke. Since then, I have suffered from breathlessness. For six days after my exposure, I had loose motions. When I burped, I got the smell of chlorine. Then I felt normal for a while and then began deteriorating. I went to JIPMER, and they said chemicals have damaged my lungs."

S. Gopal, a 75 year old farmer, says his pigeon pea crop was destroyed after an odour incident recently. Also, he says, cattle and children are particularly vulnerable to the "smoke incidents."

P. Kaundappan of Panangadu complains of regular chlorine leaks in his neighbourhood. "Where we live, we regularly get gassed. The company does not even seem to realise when we are being gassed. When we see the yellow and white smoke cloud approaching us, we have to run to the backside of the plant and throw stones at the building to raise an alarm and attract their attention. Sometimes, after the smoke incidents, the company would give us buttermilk and small onions," Kaundappan says.

The residents living alongside the illegal effluent stream too complain of serious health effects as a result of the chemical odours emanating from the stream. "Water from the *odai* (stream) comes to our doorstep when it rains. It smells like rice and makes me giddy, nauseated and causes chest pain," says P. Shakuntala, a 40-year old woman from Karumalaikoodal.

Fencline communities, like those in Mottur or Vellakalmaduvu, are particularly at risk. According to P. Rajendran of Mottur village, "There are frequent gas leaks, and some days we have to run when we see the gas cloud. There is no warning. The last leak was a month ago."

G. Mani, a 59-year old ex-worker from Srinagar Colony, speaks of a similar incident: "On February 7, 2002, I went to catch a bus and noticed that the bus passengers were raising an alarm. They could see a cloud of Silicon Tetrachloride. But it was behind me. I couldn't see. The cloud enveloped me, and I fell unconscious. The company refused to help. I was taken to a private hospital by friends. The Revenue Inspector went inside the factory and came out. I have filed a police complaint, a complaint with the collector. The SI also went in, came out and did nothing. I was given no compensation. The smell from the Cabot plant is of rotten eggs. Such incidents have happened twice. They run the plant with unskilled labour."

Locals appeared particularly agitated about the manner in which the company and the State responded to a chlorine gas leak that happened on 18 July, 2004. At least 100 people were exposed and more than 20 had to be hospitalised, including a 22-day old child, Samy Velu.

S. Matheswaran, Samy Velu's father, says the company had him sign a paper denying that there was a gas leak from the factory in return for Rs. 5000. The District Authorities and the Police reportedly hushed up the incident. No criminal investigation or proceedings were initiated against the management. Samy Velu, who is now more than one year old, is unwell even now. Till date, no compensation has been paid to Matheswaran or the others exposed to the gas.

Matheswaran and his wife Selvi displayed a pile of medicine packets and bottles, that they said was consumed by the child every month till date, nearly a year after the leak. Medical records produced by Selvi confirms that the child suffered respiratory distress and infection of the lungs due to chlorine inhalation. The couple have registered an FIR (No. 126/2004) at the Karumalaikoodal Police Station. But no action has been initiated against the company. Neither has the district collector disbursed compensation as per Public Liability Insurance Act.

Trade union rep, G. Madhappan, insists that the leak lasted less than a minute. Dr. Soundarajan, Deputy director, Public Health, agrees. "There was a gas leak and patients were admitted in the hospital. But that was a minor incident. We do not treat this as a big incident," he says. However, when asked if he visited the site or knows the details of the incident, he admitted that "We do not know how many people were affected. We discussed it with the Collector, and he said he will take some action to prevent such incidents from recurring."

P. Ayyandurai, an ex-employee, rejects Madhappan's explanation outright. "Whatever Madhappan said was a lie. When there is a leak, they can't control it easily. The [shut-off] valve is up the stairs."

Interestingly, the Block Health Supervisor, who is supposed to have investigated incidents such as the 18.7.2004 gas leak had not done so until 29.4.2005, or two days before they were to depose before the IPT panel, and nearly one year after the incident.

Impacts on Agricultural Economy

Contamination of groundwater has led to largescale decline in agricultural productivity. The IPT panel visited several farms that were lying fallow. In Karumalaikoodal, IPT visited the lands and well of Mr. P. Selvam, who had just recently cut down more than 200 barren coconut trees.

Even rain fed farming is impossible, because the "gases would assail the plants before they can yield," says Ardhanari. K. Sivaraman, a 66-year old farmer from New Kunjandiyur. "For 46 years, that land is barren. Full of thorns. That's all because of the salt godown. Even the thorny weeds are unhealthy. There is a lot of salinity in the soil."

The cattle economy has also been devastated for want of water. "We have a water problem. Cattle deteriorate and die. If we feed the crops to the cattle, they get diarrhoea. We have no drinking water. Two months ago four goats died because of exposure to the smoke from the factory. Their stomachs were bloated," says N. Vythialingam, a farmer from Saralaikadu.

Other complaints include high calf-mortality, high rates of stillbirths, and low milk yield.

Farmers have demanded full compensation for lost lands and productivity, and sought remediation of the groundwater and contaminated lands.

A. Mani, an agriculturalist quoted above from Thippampatti Kattuvalavu, estimates that about 2000 acres are damaged just in Gonur Panchayat. A total estimate of all damaged lands and wells is not available.

The impacts on the agricultural economy are evident. A. Markandeyan of New Kunjandiyur says "Our water and wells are spoilt. We have no income. We have two cows. That's all. Otherwise, I go for coolie work."

Raising cattle also involves undue hardship. "Milch cattle is our only option for livelihood. For cattle, we bring water by tanker," says K.M. Sethupathy, also of New Kunjandiyur.

Health

More than 80 percent of the 227 people that testified orally, and 84 percent of the 489 persons that gave written depositions mentioned health problems as a serious issue facing them.

Based on the testimonies received, the key sources of direct pollution-related health distress due to Chemplast appear to be the vapours from the illegal effluent stream, the contaminated water, and the frequent incidents of gas leaks. More than 85 percent of the written testimonies attributed the health problems to air pollution.

V. Chinnaiyan, a 25-year old youth from Vellakalmaduvu, "gets fits due to the smoke from the company. In one incident, I bit my tongue and it started bleeding. I get these symptoms only during smoke incidents. I have been suffering this for the last two years."

P. Karupputhurai of Gonur Panchayat cites a rapid survey he conducted of medical establishments in Mettur to support the claim that morbidity and illnesses in the industrial town are abnormally high. "Between Kunjandiyur and Mettur, there are 52 medical shops in the 8 kilometre stretch. In comparison, there are only 23 grocery stores. On average, families here spend Rs. 900 per month on groceries and Rs. 1200 per month on medicines."

From the vast number and diversity of health-related complaints, it appears that Mettur is in the grips of a human-made health epidemic unleashed by unchecked industrialisation.

Skin ailments, including of a neurological origin, bloated feeling in stomachs, respiratory disorders, menstrual irregularities, cancers and tumours, listlessness and fatigue among children and dental problems ranked among the leading symptoms highlighted by residents of Mettur. Women complain that the scarcity of clean water exacerbates ill-health within their families.

"People's health in this area is very bad. I have two [menstrual] periods a month. Chronic headaches. Lot of women have this problem. There is a lot of bleeding during menstruation. I know of women who have entered menopause at 35, 40. Some of them have been operated. Tumours and hysterectomies are commonplace. Girls reach puberty at 12. Miscarriages and premature babies are common place. My son is premature. He is 15 and mentally retarded. Many children are like that. I feel giddy when the smoke comes," says a 35-year old woman from Kunjandiyur.

Prof. Fatima Babu of IPT interacted separately with women regarding their specific complaints. Her observations bear mention:

"Women and children are paying heavily in terms of mental and physical health. Most of the women who spoke to us, and who I spoke to, complained of menstrual problems. They felt these were associated with the pollution. Irregular periods, 10 to 15 days of bleeding, two periods a month appear to be common among these women.

"Menstruation was characterised by heavy discharge, extreme fatigue and pain in the lower abdomen. Some reported that the menstrual discharge was black-red in colour and in the form of clots rather than free-flowing. Some women also complained of menstrual discharge, even during advanced stages of pregnancy. Many women sadly recounted that they had at least one miscarriage. Hysterectomies, even among younger women, seem commonplace, and some women reported entering menopause at 30 to 35 years of age.

"Based purely on the number of times, I heard these complaints in a span of three days, I believe that the issue of women's well-being is something that bears serious investigation and remedial action."

The Public Health department appeared to be totally unaware that pollution-related health disorders may exist in Mettur. Although he categorically stated that "We do not find any difference in the health of the people here," Dr. Soundarajan, Deputy Director Health Service, could not offer the panel any basis for making that claim. "People have to complain before we can take any action," he says. The deputy director, however, admits that "health inspectors are not trained to identify environmental health problems."

Dr. K. Poongodi, a Government Medical Officer from Santhanapatti, requested that she be excused for her lack of familiarity with the local health problem, because she took over responsibilities only recently. "From what I know from the PHCs, I can say that the most common complaints from the region are respiratory tract problems. Among children, we see this a lot. Infection rates are high too. Gastritis among men and women, and fever and diarrhoea." However, she adds, "Incidence of these complaints is not of alarming proportions."

Drinking Water

Given the widespread damage to groundwater, communities' access to drinking water is very poor. Many residents report that treated water supply is non-existent; others report erratic supply, and supply of poor quality water. Because contamination has rendered well-water unpotable, some of the communities get piped water courtesy of Chemplast. However, some of them report that the company cuts off their water supply if they raise issues about pollution or compensation.

Y. Muthukrishnan, a 50 year old farmer from Kunjandiyur, and a fencline resident says, "Ours is the first piece of land after the company. Five years ago, we all asked for piped water. A lot of people got it. My land got left out," he says.

A. Nallappan of New Kunjandiyur reports that after his two wells got contaminated by the pollutants from Chemplast's RC plant, they have no drinking water. "We have to walk 1 mile for drinking water. We are also buying water for cattle at Rs. 200 a load. We get piped water only for three months."

Speaking of an incident that happened shortly before the IPT hearings, M. Saraswathy of Pudusamballi recounts that "Chemical water from Chemplast entered our drinking water because the pipes run alongside each other. If we complain, the Panchayat withholds the water."

In the absence of clean water, many people report that they are forced to drink water that they know is contaminated. This is a dangerous situation especially for a community that is already reporting health distress due to air pollution and other reasons.

At various places, it appears that Chemplast's effluents run dangerously close to drinking water conduits or sources. S.K. Mohan of Raman Nagar reports that "Chemplast effluent channel runs close to the water storage facility for P.N. Patti, Veerakalpudur and Gonur. This mixes with the effluent water and as a result we get highly polluted drinking water."

Chemplast's functioning also has ramifications on the quality of drinking water for people living downstream of the Mettur Dam. That is because the company's effluents are discharged into the Kaveri. Several drinking water intake wells are located immediately downstream of Chemplast's discharge points.

The TWAD Board officials admit that "We do not do any special treatment for pollutants. Our treatment is only for standard parameters as per WHO." When asked if they have taken steps to ensure that industries don't discharge poisonous wastes in the river, TWAD board executive engineer R. Annamalai hoped that "All companies would be discharging effluents as per PCB norms. We have asked the PCB to control all the effluents, but we have not made this request in writing."

Confrontations between communities and the company on the matter of drinking water are routine. As recently as in June 2005, women from Mottur attempted to block construction work on Chemplast's compound wall in an attempt to highlight the fact that Chemplast had promised them drinking water before going ahead with the wall. The work was carried out with police protection, but the demands of the villagers are yet to be fulfilled.

Occupational Injury

Ex-workers from Chemplast report incredibly dangerous conditions at the workplace, particularly in the mercury-cell chloralkali unit, the PVC plant, and the chloromethanes facility. IPT entertained testimonials from several such workers, some of whom had visible and gross injuries as a result of historical exposure in the workplace. None of them reported to have been properly compensated or taken care of as per law. The workers seemed unaware that they have a right to compensation and lifelong treatment under the Employees State Insurance Act or the Workmen's Compensation Act.

Many of them also seemed totally unaware of the specific hazards associated with the chemicals that they were required to work with. Section 41(b) of the Factories Act requires employers to disclose full details about the hazards and proper handling techniques for various chemicals. Plant 3 Union secretary Madhappan claims that "We provide full information to our workers about the chemicals they handle and its hazards. We have MSDS (Material Safety Data Sheet) even in Tamil. Everybody including contract workers get this information," he said.

However, his colleague and labour contractor I. Ramasubban was ignorant about MSDSs, revealing the unlikelihood of Madhappan's claims. "I do not know what MSDS is. We do not provide such information to our contract workers," he says.

"I worked in the chlorine unit at the RC plant for 22 years. I'm ill because of the mercury vapour. In the mercury cell house, we would fill salt water in the mercury cell. We would collect mercury that has spilt over in 1kg jars and fill up 50kg barrels. We would collect the sludge from the drains, heat it and distill mercury. From 50kg of sludge, we would recover 1kg of mercury. They told me "This work won't harm you." I have a breathing problem, heart problem. I don't have an appetite, and my symptoms began in 1980," says R. Gopal, a 78-year old ex-worker from Panangadu.

None of the ex-workers seem to be undergoing the mandatory health check-ups required under law. "I've not had any health check-ups after my retirement," says P. Palanisamy, an ex-worker from Plant 3. "There were many chlorine attacks where I worked. But we were scared to report them. They'd give us small onions and buttermilk." A culture of fear seems prevalent where current workers are hesitant to raise issues about occupational conditions for fear of losing their jobs.

60-year old R. Govindasamy says he worked in the main lab at the chloromethanes factory. "I served in the company for 27 years. I took VRS (Voluntary Retirement Scheme). I could not work. I was the charge-man in the Silicon Tetrachloride plant. Very hazardous. I used to get chest pain, colds, breathlessness and joint pains. All workers suffer from breathlessness, loss of appetite, bloating of stomach," he says.

Others with serious and visible health problems have reportedly been made to quit their jobs. A. Sadayan Gounder, a 62-year old ex-worker, says his work-induced illness has devastated his family economy. "I would have to collect mercury from the floor. I would do it with bare hands. The work environment was saturated with caustic lye, and chlorine and mercury vapours. When I started, my fingers were long and shapely. Now look at them, they are completely disfigured and my legs and feet have these lesions. In 1988, the company forced me to take VRS. We literally fell at the manager's feet and prayed to them not to give VRS at that time because we had lots of loans. But they refused to budge. "You are not fit to work. Just leave," they said. They said I should take what I get and leave or I'll get nothing. The personnel manager actually threatened me. What all they've done to us. Every month, we spend Rs. 1000 or so for medicines. We are so deep in debt. God only knows what we'll do."

No medical assistance or compensation has been offered to Gounder.

At least two representations were received by IPT of two people who worked in Chemplast's vinyl chloride monomer plant. One was diagnosed with lung cancer in 1999, and other says he suffers from "cough, cold and breathlessness."

Local Economy

Caught in a situation where their lands have been rendered worthless, villagers say other options of earning a livelihood are not open either. Numerous people confirmed that very few local people are employed in the factory. People varyingly talk about a 3 km or 5 km area from within which no workers will be hired. "The company does not employ anybody from 3 km away. Even contract labour are not taken from our villages," says A. Balan of New Kunjandiyur. "The management has advised contractors not to employ locals."

Another recurrent complaint on the matter of jobs has to do with a sense of betrayal among residents whose families had given lands to the company on assurance that family members would be given jobs. "13 acres of family land have been destroyed because of water contamination. The company offers no employment opportunities. Other livelihoods are also not possible. I am now doing coolie work outside in Mettur," says P. Satyanathan of New Kunjandiyur.

Outstanding loans are another issue facing well-owners. Gonur, Mottur, Thunaiyoor, Thippampatti, Veeranur, and Vellakalmaduvu are all severely affected villages as far as groundwater pollution is concerned. Up to 200 wells have been contaminated, says P. Loganathan or Vellakalmaduvu. "Fifteen years ago, Vijaya Bank and IOB gave loans for the wells and now we cannot repay them because we cannot raise any crops with this contaminated water. The Government wants to recover the loans but the water is totally unfit for human or animal consumption, or farming. We have requested for a waiver on the loans.

Complaints and Evidence Against MALCO Ltd

MALCO's operations effects are disproportionately felt by the region's *dalit* community, referred to by some locals as *adi dravidars*. Ramamoorthy Nagar and its vicinity are largely *dalit* settlements.

One oral testimony by K. Natarajan, a 61-year old man from Ramamoorthy Nagar bears repetition:
"MALCO was set up in 1962 and the adi dravidas have been the worst affected. Lands of 50 farmers were taken without compensation and with the collusion of the Government. They have filed false cases against us and we only demand compensation and jobs which they have denied. They offered to relocate us, but refused compensation. So now they are dumping the red mud in our village. Four cows and 100 goats have died in the red

mud dump. Red mud and bauxite gas pollution has claimed many lives. For the past 100 years, the land was in our control and we have spent generations on it. This management occupied the land illegally. Now, they are accusing us of theft. So they want to erect a compound wall. No action was taken against security officials who were caught stealing in the factory. Instead, they accuse our boys. Even when the cattle die, cow owners from our village don't get compensation. Instead the ask us why we let our animals on the dumpsite. They want us out of here. Our well and drinking water is spoilt. Please clean it. We do not want closure because that will affect us again. They might threaten to close, but they will never do that. We want compensation and jobs."

Red Mud dumping

On 29 April, 2005, the IPT panel visited a massive "Red Mud" dump on the banks of Stanley Reservoir. A thin bund separates the Red Mud dump from the Reservoir. According to locals, at the reservoir's high water mark, water comes up to the bund level. They say heavy rains can cause a breach in the embankment that would empty the entire dump into the reservoir. Such an occurrence would have disastrous and far-reaching consequences given that the Mettur Dam marks Kaveri's entry into Tamilnadu.

During its visit, the Panel observed that Red Mud, in the form of a viscous sludge, was being trucked and dumped atop the existing dump. Entire hillsides are covered and filled with Red Mud. The sun-dried red mud is churned up as super-fine powder by the trucks or any passing vehicle. The panel noted that none of the workers or the drivers handling the waste had any form of protective gear except their own handkerchiefs.

Red Mud contains, among other things, silica, iron, titanium, calcium oxide, caustic residues and heavy metals such as mercury. Silica is a respiratory hazard, and also targets the eyes. Symptoms of exposure to Silica include "cough, wheezing, decreased pulmonary functions, progressive respiratory symptoms like silicosis" and irritation of the eyes. The chemical is listed as a Carcinogen.[10]

M. Madhappan, a 63-year old man from Ramamoorthy Nagar, says: "Red mud from Malco is dumped near our house, which is carried into our house by the wind. The odour is intense and causes a lot of breathing problems."

The wife of a man who worked at the MALCO loading site said he inhales a lot of dust. "My husband died of heart attack five years ago. He would often complaint of congestion in the chest," she said.

All villages lining the Red Mud dump experience breathing distress during summers when *Sooravali* (whirl-wind) winds blows the dust into the villages. Many villagers complained about losing cattle that were exposed to the red mud. Goats and cows that accidentally step into the Red Mud are burnt by the caustic lye in the Red Mud. The IPT panel saw several emaciated goats whose skin was burnt reportedly because of exposure to Red Mud.

B. Sivagami, a 41-year old woman from Ramamoorthy Nagar, says: "I live near the Red Mud dump. The hooves of the goats come off [when they step in the Red Mud] and I have lost 28 goats in three different incidents. I got no compensation."

The frustration of people like Sivagami with MALCO is palpable, particularly in places like Ramamoorthy Nagar. "They are like white men, our village is not really independent. We are still under MALCO's rule. We do not even get coolie work. Our water is spoilt, and if the goats drink the water, they get diarrhoea and we spend 200, 300 rupees on its treatment. We just want jobs and we will even take care of our medical expenses."

[10] "NIOSH Pocket Guide to Chemical Hazards." US Dept of Health and Human Services, Centre for Disease Control and Prevention, NIOSH. February 2004.

Pollution

Air pollution from the refinery/smelter complex, soot deposits from the Thermal power plant, and regular noise pollution (including explosions) in the Thermal power plant comprise the bulk of pollution-related complaints from the community.

K. Mohan, a 45-year old man from Bharati Nagar says: "I have a shop where I sit morning through evening. The smoke and soot from the factory irritates the eyes." People report frequent emissions of intensely acidic smoke, and odours such as of burning flesh or rotten eggs.

"When bauxite is converted to alumina, there is a rotten egg smell," explains a 30-year old man from Thengalvarai, who works as a "coolie" at MALCO's coal handling yard.

"Smoke from the factory causes ulcers in the stomach, mouth and throat, and acid smoke from the factory causes skin burns that don't heal," says Sivagami.

IPT visited the community resident at Mettur R.S. They complained of coal dust from the conveyor belt overhead. One provision store vendor showed us items such as toothpaste, soaps, and detergent packets from his shop. They were all covered in soot. Another young boy brought us the cloth they had used to filter the water that morning. It had a thick layer of soot and silt on it. People say the soot inside houses causes cracked feet.

Regulatory agencies would appear to be doing little to deal with the existing problem, and may even come for blame for allowing the problem to worsen. "Just a month ago, I was in the market in R.S. and there was a furnace smoke from MALCO. They have put up a new plant without any information," says Mohan.

P. Ramakrishnan, a 50 year old man from Ramamoorthy Nagar, recounts that MALCO had told them that this would be a oil-fired plant and not coal-based.

Noise Pollution

Many people complained of frequent explosions associated with the release of pressure inside from MALCO's Thermal Power plants. They report that it happens at any time of the day or night, and startles people. Children reportedly are petrified and inconsolable for hours after such explosions. Villagers complain that they are not even warned about it. One resident said some old people die of shock.

Water

Some residents complained that the water supplied by MALCO, their only source, is often contaminated and unpotable. Many villages lack even this supply.

According to local people, MALCO's effluents are dumped in the Kaveri. Some villages near the Red Mud area attribute the contamination of their wells to leachates from the Red Mud dump.

Breaches in MALCO's effluent ponds have led to serious disasters. "On 18 March, 2004, there were heavy rains, and at night, the MALCO compound wall breached and water from the factory entered Jeeva Nagar and a lot of people's houses were washed away. They promised compensation and underground drainage. Till date, the company has not delivered on its promise," says P. Maniraman, a 35 year old ward councillor resident at MALCO Colony.

Occupational Health Hazards

The IPT observed the work conditions at the Red Mud dumping area. The workers were covered from head to toe in a fine layer of Red Mud dust. None of them had any protective gear, although all had covered their noses and

mouth with handkerchiefs or other pieces of cloth. Despite the caustic nature of the Red Mud, most of them were casually clad in ordinary shoes or even sandals.

IPT was not able to witness the conditions in the other parts of the factory. However, workers' testimonies indicate that conditions are only marginally better.

"I work at the MALCO waste plant and the Pot Room. I get constant headaches and for the past four years, sometimes I cannot see distant objects clearly. At work, I spend hour an hour in the waste Pot Room, and I get half an hour's rest. It is extremely hot inside. Sometimes, the Pot Room smells bad. It gives out yellow smoke and smells of burning flesh. It gives me a headache and causes dizziness. They give us eye-glasses and masks to wear," one worker says.

Another casual labourer who has worked for six years in the coal unloading unit says she gets no support from her employer for treating even her work-induced health problems.
"I have body pain. I got no treatment for occupational illness. We have nothing. Even then, the company retains Rs. 25 per day from my daily wage of Rs. 162.50," she says. Another 34 year old woman who also works at the coal loading unit suffers from "intense back pain and pain in the arms." Body and back injuries and pain are common complaints related to work involving lifting and moving heavy objects.

Like with Chemplast, the IPT found that MALCO too had abandoned its injured workers. "I worked at MALCO and was injured 11 months ago. My leg had to be amputated, and they gave me medical treatment. But no compensation was given. I was a coolie worker," says 36-year old Mottur resident P. Selvam.

P. Ramakrishnan, a 50 year man from Ramamoorthy Nagar, says the pollution is worse ever since the company changed hands in 1995. "MALCO was not a problem before 1995 because the production was low. Now the production has increased. So, they load more than the capacity of the pots. Therefore, there are a lot of fugitive emissions," he says.

3 Summary of Findings and Recommendations

During its three days in Mettur, the Panel was convinced that there is a serious problem with the way that Chemplast and MALCO are handling highly hazardous processes and their by-products. As if that in itself was not enough cause for concern, the IPT was also disappointed at the lack of response of the industries and several Government agencies to a citizen-initiated effort to understand and address the problem.

We conclude that Chemplast Sanmar and MALCO have caused irreparable damage to humans and the environment. Human and animal life is in peril. They all suffer from one ailment or the other. The land has lost its fertility, and most of the lands are lying fallow.

We personally confronted several sobering facts:

- The discharge by Chemplast Sanmar of overpoweringly smelly effluents "legally" through a pipeline into the Kaveri.
- The dumping of highly toxic mercury wastes by Chemplast in pits located uphill of several water sources, including the Kaveri.
- MALCO's indiscriminate disposal of toxic Red Mud on the banks of the Stanley Reservoir, and the Government's apathy towards that.
- Several people who had been severely and visibly injured due to occupational incidents or routine occupational exposure to toxins, had received none of the compensation or medical care that is lawfully due to them.
- Neither MALCO nor Chemplast seem to have been penalised for their lapses.
- Chemplast, MALCO and several relevant Government departments, including key regulators, did not attend the Tribunal or clarify our requests.

The overwhelming response to the public hearing – more than 800 people attended at least 600 deposed before the panel – provided the strongest testimony to the gravity of the pollution problem in the area.

The constitutional Right to Life enshrined under Art. 21 includes Right to a Clean Environment. Right to live also means a life with all dignity. This basic right has been violated by the actions of MALCO and Chemplast Sanmar. The damage caused by pollution may well be irreversible, and calls into question the worth of such industrialisation. The industries are not operating as per the law, and the regulators and district administration are not doing anything to ensure that laws are not violated.

Vast areas of food-producing lands are now unproductive and barren. Water in many of the wells carry a variety of odours, or are saline. The condition of the few livestock that we witnessed is pathetic. Working conditions as reported by workers like Sadayan Gounder are medieval.

Our experience with the trade unions was disappointing. Far from being the voice of conscience and the force that holds the company accountable to workers and the community, the trade unions submitted copies of two versions of a very similar statement signed by numerous workers that stated, in essence, that all is well with the factories, that effluents are treated properly, that none of them suffer from any ailments, and that they all lead a happy life. It would be fortunate if this were true. What is disappointing is that the trade unions haven't taken any interest in fighting for the rights of workers injured at work or due to work conditions, or for the rights of the communities who are at the receiving end of the companies' pollution.

Many workers told us that both in MALCO and at Chemplast, highly hazardous activities requiring skill and special training were handed to untrained workers and even contract employees.

Water, acknowledged universally as a fundamental human right, remains elusive to many people who have lost their local water sources to contamination by the industries. Even worse, the State has abdicated its responsibility of supplying water to the Polluter. This is dangerous because companies can control public dissent by controlling access to water. The State must hold on to the responsibility of supplying water, but make the Polluter bear the costs.

The Red Mud dump is a disaster waiting to happen. If no action is taken now, knowing about the possibility of a spill into the Stanley Reservoir, it would be futile to engage in collective chest-beating after the inevitable happens.

Similarly, the discharge of demonstrably toxic effluents – containing exceedingly high levels of carcinogens such as Ethylene Di Chloride and Vinyl Chloride – into the Kaveri in the vicinity of drinking water intake points, and upstream of the entire course of the river in the State is foolhardy.

Our findings with respect to the allegations levelled against Chemplast Sanmar and MALCO Ltd are dealt with below.

Violations by Chemplast Sanmar

There were seven major allegations against the Chemplast Sanmar Ltd. Out of these the Panel could examine only six and the seventh one could not be examined in the absence of any relevant depositions or documents.

Allegation 1: Chemplast indiscriminately disposed toxic wastes in and around the factory site.

The IPT personally witnessed the disposal of highly hazardous effluents both through a "legal" pipeline and through an illegal effluent channel. Scientific evidence presented by CEM regarding the toxicity of the "legal" effluents, and the report submitted by M. Arunachalam and M. Muralidharan regarding the effects of pollution on fish in Mettur corroborates local concerns that the Kaveri is being polluted.

We also saw the mercury sludge dumps located on hillsides, and were informed about the burial of tarry wastes in wells within the factory. This runs counter to common sense and established practices for dealing with such wastes. The open pit containing mercury sludge had badly compromised liners. Mercury compounds are highly potent neurotoxins, and methyl mercury – a common form of mercury in the environment – threatens the health of aquatic ecosystems in particular.

The illegal effluent channel that runs through Karumalaikoodal and Ajaya Nagar causes untold distress to residents living alongside the stream.

Finding:
Based on its own inspection and the statements offered by residents and workers, the Tribunal finds that Chemplast Sanmar Ltd. has indeed indiscriminately disposed toxic wastes in and around its facility.

Allegation 2: Chemplast contaminated the groundwater and rendered numerous wells and borewells unusable.

The Tribunal visited several downstream wells and heard testimonies of villagers from Gonnur, Thippampatti-Kattuvalavu, Karumalaikoodal, New Kunjandiyur, Panangadu, Saralaikadu, Komburankadu, Veeranur and Mottur. All of them had palpably polluted water. Some smelled strongly of organic chemicals; others were brackish. All were unusable.

Moreover, since the 1960s, district authorities have acknowledged the pollution and ordered remediation and compensation. Some farmers have also received one-time compensation demonstrating an acknowledgement of responsibility for the pollution by Chemplast. A few families are also supplied drinking water by the company.

Till date, many farmers who are unable to put their lands to good use have gone into debt. No compensation has been paid to the community whose lands and water have been affected by contamination from Chemplast. No remediation work has been initiated to repair the damage to the groundwater and lands.

Finding: *Given our earlier finding regarding the casual disposal of toxic wastes and effluents, we find it highly likely that the contamination was caused by a downward spread of contaminants from Chemplast's waste facilities. We also find that the farmers, landless labourers and residents dependent on these lands and water have not been compensated. Neither has any effort been taken to remediate the environment.*

Allegation 3: The authorities and the company downplayed serious pollution incidents.

There are recorded instances of several serious pollution incidents, including chlorine releases and fish kills in the Kaveri. As described in the evidence section above, neither the authorities nor the party potentially responsible for the pollution (in the case of the fish kills) have sought to investigate the root causes and fix them, or assist the victims of pollution financially or medically.

In the case of the fish kills, the Tamilnadu Pollution Control Board has shown remarkable reluctance to deploy the tools of science to go behind the reasons for depletion of dissolved oxygen.

Sweeping statements by trade union leaders who claimed that no serious pollution incidents occurred in the recent past tend to undermine their credibility. Further, no management representative of Chemplast's chlorine plant associated with the chlorine release of July 18, 2004 was present before the Tribunal.

It is unfortunate that the health officials have also downplayed a serious matter. Their conduct only exhibits abject apathy to the serious epidemic of these environmental problems.

The Tribunal takes into account the complaints of many Mettur residents and the facts before it concludes that there have indeed been many gas leakages in the past. The chlorine release of 18.7.04 affected more than 100 persons. However, neither the district administration nor the environmental regulators have attempted to provide even the legally required relief to the victims of the disaster. It is unfortunate, and reflects very poorly on our society, that even the presence of a 22-day old child victim did not change the callous attitude towards the victims. The child, Samy Velu, continues to suffer even as his parents struggle to keep up with the mounting medical expenses.

The effects of chlorine can be lasting, and may even manifest across generations. Considering that Samy Velu was affected at such a tender age, long-term effects cannot be ruled out. Who will provide for his well-being – the State or the Polluter?

Finding: *The Tribunal accepts the complaints of Mettur residents and the facts before it, and concludes that there have been many gas leakages in the past. It is also a fact that the survivors of the 18th July chlorine release have not received even their legally entitled relief, such as under the Public Liability Insurance Act, 1996, administered by the District Collector. The Tribunal also finds that the State, Chemplast and Chemplast Workers Unions have downplayed serious incidents.*

Allegation 4: Chemplast contaminated the River Kaveri with its chlorinated effluents and mercury.

Under Allegation 1 and 2, we have found that the Company indiscriminately dumped its effluents into Kaveri via channels and pipelines. An air sample taken from above Chemplast PVC plant's effluent outfall into the Kaveri revealed the presence of 17 chemicals, 7 of which are chlorinated organic chemicals. There are at least 6 cancer-causing chemicals such as benzene, ethylene di chloride (EDC), vinyl chloride monomer, chloroform and methylene chloride. 1,2 Dichloroethane (EDC) is 32,000 times higher than safe levels.
M. Arunachalam and M. Muralidharan's study of fish diversity and health in the stretch of Kaveri downstream of Chemplast's effluent outfall also indicate that only hardy varieties of fish remained in the stretch immediately downstream and as far away as a kilometre. The study also reported tissue damage characteristic of heavy metal toxicity in their histological analyses of the sampled fish. The authors conclude that "In fishes exposed to pollutants like mercury and arsenic, these changes are evident."

Our personal experience of the overpowering organic odour from the "illegal" effluent channel also leads us to believe that the natural drain is being used to carry Chemplast's effluents bypassing legal scrutiny to the Kaveri.

Again, neither Chemplast nor the regulator Tamilnadu Pollution Control Board was available to confirm or correct our understanding.

Finding: *It is our finding that the effluents discharged by Chemplast into the Kaveri are indeed noxious. It is also our suspicion that mercury pollution may be the cause behind the damaged tissue in fish sampled in Arunachalam and Muralidharan's study.*

Allegation 5: Chemplast placed millions of people at risk of long-term effects due to the consumption of contaminated water, fish and other food raised using the contaminated Kaveri water.

The evidence for the allegation has been presented above. The potential for long-term effects is very real considering what we know about PVC production. Chemicals like dioxins and furans are inevitably released from operations like Chemplast's PVC and chloromethanes production. Such chemicals are capable of exerting toxic effects for a long time and even when acting at very small, even undetectable, doses. The potential of mercury contamination of the River Kaveri is very troubling for two reasons. One, people may already be experiencing the effects of these poisons. Since, nobody is monitoring, there is no way of telling. Second, mercury contamination over vast stretches of the river may prove difficult to remediate.

Also, many residents complained to the IPT about how they must consume contaminated water when the piped water fails. Nearly 30 percent of the people who testified mentioned the lack of secure and safe "drinking" water as an issue.

Finding: *The IPT finds that Chemplast has placed entire communities at risk of long-term effects due to consumption of groundwater, fish and other food raised using contaminated Kaveri water. The IPT also finds the Government negligent in fulfilling its duties of ensuring, at the very least, safe drinking water to people.*

Allegation 6: Chemplast exposed its workers to unsafe work conditions, and failed to address their occupationally induced health problems.

The members of the Tribunal heard from many ex-workers who stated that no safety devices are given to them and that no precautionary measures were taken to protect them from harmful substances. We personally interviewed workers who had visible injury. The case of Mr. Sadayan Gounder bears mention. He worked for several years in Chemplast's mercury cell-house. His fingers and toes are entirely deformed, and the skin on his legs has rashes and looks painfully swollen. Not only was he not compensated as due to him under the law, but he was also forced to take voluntary retirement at a time when he was already in debt because of medical costs.

Testimonies that highlighted the fact that workers handle mercury with no protection were shocking. Allowing unprotected workers to enter an environment filled with chlorine, mercury, and caustic fumes is a violation of established labour practices and the rights of labour.

Despite these lapses, no corrective or punitive action has been taken against the company by the Inspector of Factories. The Factories Department did not attend the Tribunal.

The Tribunal heard from many workers injured due to accidents. These and others likely injured due to occupational exposure have not received proper attention and compensation.

Workers and community residents said that untrained workers are employed and the companies avoid the experienced workers who would question the unsafe conditions prevailing and demand safety devices.

Also, it is clear that the company does not fulfil its obligations under the Factories Act. Regular lifelong health checks required by the law have not been done for ex-employees who worked in hazardous areas.

Finding: *The company is found to have violated labour safety laws and practices. It has placed its workers in harm's way, and done nothing when they were harmed.*

Allegation 7: Chemplast laid claim to substantial quantities of the reservoir water despite the latter being earmarked for drinking and irrigation purposes.

No material evidence was placed before the Tribunal to consider this aspect. So, there is no finding on this allegation.

Violations by MALCO

The following allegations against the MALCO Ltd. were enquired into by the IPT

Allegation 1: Malco stored "Red Mud" waste on the banks of the Stanley Reservoir, thereby threatening the water security of millions of people.

The IPT visited the Red Mud dumps on the banks of the Stanley Reservoir. A flimsy embankment separates the Red Mud dump from the Reservoir. Workers involved in loading, unloading and transporting the Red Mud were totally unprotected.

Finding: *Red Mud has been dangerously dumped on the banks of the Stanley Reservoir. We find the Government authorities that have permitted this practice to be negligent in their responsibilities. A breach in the embankment during heavy rains could result in the contamination of the reservoir.*

Allegation 2: Malco failed to address complaints of local people relating to livestock injuries due to "Red Mud," dust pollution during summers, and red-mud runoff to the river during wet season.

We were shown cattle with injuries – bald patches on the skin – caused reportedly by exposure to Red Mud. The caustic constituency of Red Mud provides reason to believe that exposure to it causes skin burns. Numerous villagers, particularly from Ramamoorthy Nagar, complained of having lost cattle or goats to the Red Mud dump.

Also, dried Red Mud can easily be stirred up as a fine dust and carried with the wind. We personally witnessed this when we drove along the Red Mud dump. The vehicles that the IPT panel went in raised a lot of dust, and many of the members were covered with dust, as were the vehicles.

Finding: *We confirm villagers' reports that cattle are badly affected due to exposure to Red Mud. We also confirm villagers' complaints that the fine dust causes health hazards – particularly respiratory distress – among residents living near the dumpsite.*

Recommendations

Having heard in person the woeful narrations of the helpless people, and having examined the evidence validating their charges, the Panel firmly believes that serious and urgent action should be taken to ensure that basic rights of the people of Mettur are respected, upholding the principles of environmental and social justice. Their right to a healthy life with human dignity should be respected.

We are of the view that the current state of affairs at Mettur amount to slow poisoning of hapless humans, animals, and vegetation. Urgent intervention by the authorities is required.

The Indian People's Tribunal, having perused all available evidence and taken into account the testimonies of villagers, ex-workers, workers and the few Government officials that deposed in front of us, makes the following recommendations to uphold the environmental and human rights of the Mettur residents, and remediate the damages caused to the environment.

Strict Enforcement of the Law

- Chemplast and MALCO must be officially examined for compliance to various environmental and worker safety regulations. The Tamilnadu Pollution Control Board, the Factories Inspectorate and the District Collector are all empowered to investigate and take action against violators. They must exercise this mandate and issue notice to the companies for any violations observed in the manner they handle their pollutants or the industrial processes that have a bearing on the safety and well-being of workers and communities.
- A Local Area Environment Committee, as has been formed in Cuddalore SIPCOT and Manali industrial areas, may be constituted by the Supreme Court Monitoring Committee for the purposes of monitoring and ensuring compliance by the Companies to Indian environmental regulations, and related laws dealing with the protection of life and property. Such a Committee may include persons of unshakeable reputation and integrity from Mettur and nearby areas.
- Action should be initiated against Chemplast and MALCO for violating labour regulations, particularly the rules that require them to provide regular medical check-ups for former workers.
- The District authorities should constitute District and Local Crisis groups as laid out under the Rules for Emergency Planning, Preparedness and Response for Chemical Accidents, 1996 (EPA). The groups must be given adequate training to respond to emergencies.
- Chemical accidents and incidents must be viewed seriously. Police complaints should be filed against companies responsible for such incidents; investigation must be initiated by the Tamilnadu Pollution Control Board and the Factories Inspectorate; compensation and medical assistance should be given to the victims; and steps should be taken to rule out the recurrence of such incidents.

Provide Clean Water

- TWAD Board, Panchayats and the District Administration should meet immediately to ensure the permanent provision of clean water to the communities living around Chemplast and MALCO. Costs for the same may be recovered from the Companies. The responsibility of supplying water should remain with TWAD Board, Panchayat or the District Administration and not left to individual companies, as is the case now with some water-contamination-affected communities.

Improve Availability and Access to Health Care Facilities

- Free or inexpensive and quality health care is not easily accessible for Mettur's pollution-impacted residents. The Government is urged to improve the public health facilities in Mettur in light of the special placement of Mettur residents as people suffering the effects of pollution.

Assess and Quantify the Damages

- The Government may order to perform a comprehensive health study covering 35 villages in the vicinity of the factories in Mettur to assess the impacts of pollution from Chemplast and MALCO. The study may be designed to yield data on the nature and patterns of ailments and symptoms afflicting this population, so that appropriate medical facilities and treatment may be made available.
- The Government may order the conduct of comprehensive studies documenting the extent of lands and the number of groundwater sources rendered useless by contamination from Chemplast and MALCO.
- The TNPCB may cause to be conducted an assessment of the nature and extent of pollution of a) groundwater; b) river; c) river fish with a view to recommending remediatory measures.

Remediation & Compensation

- Victims of Chemplast's 18.07.2004 chlorine release incident must receive full compensation under the Public Liability Insurance Act. Victims are encouraged to re-apply to the District Collector seeking their legally entitled relief under the above Act. The District Collector may also extend assistance to ensure that the victims have access to quality and free medical care. Particular attention may be paid to ensure the well-being of 1-year old Samy Velu who was a 22 day old infant at the time of the leak.
- Chemplast must compensate all farmers whose lands and wells have been rendered useless due to contamination. The compensation must cover the historical loss of income and the future losses due to the drop in crop productivity. Farmers are advised to approach the Loss of Ecology Authority set up pursuant to the directions of the Supreme Court to seek compensation and remediation of lands and water.
- Workers injured at the workplace or suffering diseases caused by workplace exposure to toxins are requested to approach the local ESI office for compensation/pension and medical assistance as per the provisions of the Employees State Insurance Act. Also, the Labour Department, Trade Unions and community groups are requested to assist in the matter by identifying affected workers and helping them file compensation claims.
- The ESI health facilities are virtually non-existent as far as workers are concerned. Given that workers pay their dues to ESI, there is no reason why the services guaranteed to them under law should be denied to the workers. The local ESI officials may ensure that the ESI hospital and clinic facilities are running and available to registered workers and their families. This should be no problem considering that the Employees State Insurance Corporation has more than Rs. 70 billion in reserves.
- The Factories Inspectorate may be directed to take steps to improve the workplace environment and safety. They may conduct expert investigations of Chemplast and MALCO factories to identify hazards and fugitive sources of toxic emissions, and may ensure that steps are taken to eliminate these hazards and seal the emission sources.

Effluents and Toxic Wastes

- Action should be initiated against MALCO for dumping Red Mud on the banks of the Stanley Reservoir, thereby threatening the water and livelihood securities of entire communities living downstream of the Reservoir. Regulators that have permitted this dangerous practice may also be dealt with firmly.
- MALCO should be directed to remove the Red Mud from the banks of Stanley Reservoir immediately, and dispose it off as per best international practices.
- Flyash from Chemplast, MALCO and other power plants may be disposed without causing harm to humans or environment.

- The Tamilnadu Pollution Control Board should stop Chemplast from discharging its effluents – treated or untreated – into the River Kaveri either directly through piped outfalls, or indirectly via channels and streams. Discharges of effluents from MALCO to the River Kaveri may also be stopped forthwith.
- The TNPCB should engage experienced and internationally reputed agents to recover the toxic wastes – including EDC/VCM tars and mercury-bearing brine sludge – from the pits within Chemplast, and arrange for their disposal as per best international practices.
- Chemplast may be directed to immediately end the use of mercury cell technology at its plant in Mettur, and shift to less hazardous technologies.

Training and Capacity Building

- Private and Government doctors may be trained to diagnose and treat pollution-induced ailments, and a system may be put in place to use the medical establishment to collect data regarding health condition of the Mettur communities.
- Improve the medical infrastructure available to the Mettur residents, particularly at the Government health centres.
- Workers and residents may be educated on their rights. Workers and their families are entitled to free lifelong health care at ESI hospitals. They are entitled to a safe working place. Residents would need to understand their rights as citizens and also learn ways to assert their rights. In particular, residents would need to know about the Public Liability Insurance Act and the provisions for compensation to victims of industrial disasters.
- The Police and District Administration should end their hostility towards communities. The Police, in particular, is duty-bound to accept complaints filed by residents against the companies. Training in human rights and law may be given to the Police and District Administration.

Annexure 1

Chemicals Likely to be found in Mettur Environment as a Result of Industrial Pollution

Chemplast Sanmar Ltd.
Emissions from Chemplast's units include:

Ethylene Dichloride:
Ethylene Dichloride (EDC) is primarily used in the manufacture of Vinyl Chloride Monomer – the building block for PVC. It is both an intermediate in the manufacture of PVC and a pollutant released from PVC facilities in large quantities. It is a pleasant-smelling, colourless, volatile liquid, which does not persist long in the environment but is both hazardous and toxic. It decomposes on heating and on burning, producing toxic and corrosive fumes including hydrogen chloride and phosgene.

Because of its volatility the prime route of exposure is through inhalation. However, it can also cause harm through skin or eye contact. It causes irritation of the eyes, the skin and the respiratory tract. Inhalation of the vapour may cause lung oedema – a condition where the lung fills up with fluid. EDC also impairs the functioning of the central nervous system, kidneys and liver. Other symptoms of exposure include - abdominal pain, cough, dizziness, drowsiness, headache, nausea, sore throat etc.

It is distributed to all tissues of the body and can pass both the blood/brain barrier and the placenta. EDC is classified by the International Agency for Research on Cancer (IARC) in Group 2B (possibly carcinogenic to humans) and can be toxic at concentrations too low to be detected by smell. In animals it causes cancer of forestomach, mammary gland and circulatory system.

Once released in the environment, EDC volatilises into the air. It is not absorbed into the soil but it leaches through the soil to the groundwater where it remains for a longer time, thus contaminating the water.

Vinyl Chloride Monomer (VCM):
Vinyl Chloride is both an intermediate in the manufacture of PVC and a pollutant released from PVC facilities in large quantities. VCM is a colourless sweet smelling gas under normal conditions. It is a known human carcinogen (Group 1 as assessed by IARC). Studies demonstrate that it causes malignant tumour of the liver in the occupationally exposed; other studies have also shown elevated levels of cancer of brain and nervous system, lung and respiratory tract and the lymphatic system.

The main route of exposure to VCM is through inhalation. Vinyl Chloride is known to cause lung related problems. Inhalation of VCM can cause dizziness, headaches, drowsiness or unconsciousness, memory loss, sleep disturbances, and nervousness. Damage to nervous system manifests itself as tingling, pain or numbness in the fingers. VCM also affects the immune systems, liver, spleen, thyroid functions, and reproductive system in both men and women.

In the wider environment, VCM is not persistent. If released to water VCM volatises rapidly to the air. In soil, VCM migrates rapidly to the ground water.

Hexachlorobutadiene (HCBD):
Hexachlorobutadiene is a colourless liquid with turpentine like odour. It is produced either commercially or as a by-product of manufacturing other chlorinated hydrocarbons including Tetrachloroethene, Trichloroethene, VCM/PVC, and Carbon Tetra Chloride.

Hexachlorobutadiene is a widespread environmental contaminant. It can exist in the atmosphere as a vapour or absorbed to airborne particulate matter, and it has been found in the wastewater from the chlorine industry, in leachate from landfills and hazardous waste sites and in air, soils, surface water and sediments. It has also been detected in the fly ash from the incineration of HCBD-containing hazardous wastes. It is toxic to aquatic organisms. It also bioaccumulates in the food chain, especially in the fish.

If ingested HCBD concentrates in the kidney, the main target organ. HCBD interferes with the fundamental process of cell respiration and can, as a result or alongwith other compounds in the body, react with DNA, resulting in cell death or the development of tumours. It is also know to cause damage to the liver. It is classified as a potential occupational carcinogen and causes kidney tumours in animals.

HCBD is an indicator of the presence of even more toxic chemicals such as dioxins and furans.

Carbon Tetra Chloride:
Carbon Tetra Chloride is an ozone depleting substance. Ozone layer is like a blanket around the earth that protects the earth form the harmful ultraviolet radiations of the sun. Damage to ozone is directly linked to radiation-induced illnesses like skin cancer.

Carbon Tetra Chloride is a clear, colourless, non-flammable liquid, heavier than but moderately soluble in water. In contact with flame it breaks down into poisonous gases, including hydrogen chloride and phosgene.

Carbon Tetra Chloride is a known carcinogen in animals and humans. It induces DNA synthesis and causes conditions where more or less than a normal set of chromosomes are found in the cells of individuals. High exposure to Carbon Tetra Chloride can cause damage to the central nervous system, liver, and kidney, causing waste build-up in blood. Other symptoms are headache, dizziness, sleepiness, nausea and vomiting. In severe cases exposure to Carbon Tetra Chloride can also cause coma and death.

Carbon Tetra Chloride is relatively stable in the environment. If released to land, it does not absorb into soil, but migrates readily to ground water where it may remain for months or years. Under anaerobic conditions Carbon Tetra Chloride can be biotransformed, producing hazardous intermediates like Chloroform and Methylene chloride.

Chloroform:
Chloroform is a heavy, colourless, non-flammable liquid with a sweetish burning taste and a pleasant, sweet, ethereal odour. It was used as an anaesthetic in the past but the US FDA banned the use in 1976 after it was found that chloroform is a potential carcinogen. http://www.healingworld.co.nz/articles.asp?print=1&article=3

Exposure to Chloroform may cause irritation of eyes, skin, dizziness, mental dullness, nausea, confusion, headache, weakness, exhaustion, and enlarged liver. Chloroform is also a potential occupational carcinogen and causes cancer of liver, kidney and intestine in animals. It has also shown to cause reproductive damage in lab animals.

Chloroform evaporates easily to air, where it breaks down slowly. Breakdown products in the air include phosgene and hydrochloric acid, both of which are extremely toxic. It is poorly absorbed in the soil and can travel through soil to ground water where it may persist for years. It dissolves easily in water where it may break down to form other chemicals. It is extremely toxic to aquatic animals.

Methylene Chloride:
It is a colourless liquid with chloroform like odour. Exposure to Methylene Chloride may cause irritation eyes, skin, weakness, exhaustion, drowsiness, dizziness, numbness, a tingling sensation in the limbs, and nausea.

Methylene chloride is a potential occupational carcinogen and causes cancer in the lungs and liver of animals. Exposure to high levels of Methylene chloride may cause unconsciousness and even death.

Methylene chloride is poorly absorbed in the soil but can travel through soil to ground water where it may persist for years.

Chlorofluorocarbon (CFC):
Chlorofluorocarbons are colourless to water-white liquids with a pungent, sweetish odour like Carbon Tetra Chloride at high concentrations. They are often used for refrigeration purposes. Exposure to CFCs may cause irritation skin, throat, drowsiness, dermatitis, effects on the central nervous system causing depression, confusion, drowsiness and unconsciousness

Mercury:
Mercury is a silver-white, heavy, odourless liquid metal. It is used as a catalyst in industrial processes. It is also used in the manufacture of chlorine and caustic soda.

Mercury is an extremely toxic chemical and exposure to it can cause symptoms like vision and hearing disturbance, jerking limbs, trembling of fingers, dizziness, nausea, vomiting, emotional disturbance, and kidney injury. It is also known to effect children born to exposed parents. Mercury is a neurotoxin and affects the central nervous system. Children exposed to mercury show symptoms of mental retardation and sensory disturbances.

Mercury is toxic to aquatic animals and is persistent in the environment. It bioaccumulates in the food chain, especially in fish. The fishing town of Minamata in Japan suffered a severe methyl mercury poisoning incident during the 1950s and 1960s. Mercury was discharged in the Minamata Bay from a factory owned by Chisso Corporation. Over years, the mercury accumulated in fish that was consumed by the local community. More than 20,000 people were reportedly affected by the mercury contamination.

Dioxins and Furans:

Dioxins and Furans are among the most toxic substances known to science. They are chemically stable and take decades and even centuries to degrade in the environment. Dioxins and furans tend to concentrate in the fatty tissues. They accumulate in the food chain and are found in highest concentrations in humans and other predators like eagles, bears and whales that are at the top of the chain.

Sources of dioxins and furans are numerous, including combustion processes like incineration, chemical manufacturing, and metal smelting, refining and processing.

Dioxins and furans are classified as Class 1 carcinogens, i.e. they cause cancer in humans. They affect the immune system, male and female reproductive system, cause developmental impacts on foetuses, and affect the neurological and sexual development of children. They are thought to cause a decline in sperm count among exposed men. Dioxins and furans also cause diabetes and weight loss.

Other Organochlorines
The production of PVC yields a complex cocktail of organochlorine chemicals in the gaseous, solid and liquid effluents. Many of these chemicals are persistent in the environment. They have the ability to affect life at fundamental levels, and over generations.

Madras Aluminium Company Ltd

Effects of gases emitted during aluminium smelting:

Suspended Particulate Matter (SPM):
Suspended Particulate matter is generated during the primary electrolytic aluminium smelting. SPM contains soot, smoke, products of incomplete combustion of organic matter and dust. Such particles are generally larger than 10 microns in diameter and thus are too large to be inhaled beyond the nasal passage. Children are primarily affected by SPM as they are in the habit of breathing through their mouths. Thus, SPM enters their lungs, bypassing the nasal clearance mechanism. It causes breathing troubles, wheezing, asthma, and bronchitis.

Carbon Monoxide (CO):
Carbon Monoxide is a colourless, odourless, tasteless toxic gas, which is a product of incomplete carbon combustion. It is released in the atmosphere by smelters. CO reduces the oxygen carrying capacity of the blood thus creating a deficiency of oxygen in the organs and tissues.

Symptoms of exposure to CO could vary from - headache, weakness, dizziness, nausea and vomiting to coma and death (in case of prolonged and intense exposure). Children and pregnant women are most susceptible to CO toxicity. The release of carbon monoxide is of particular concern to workers in the factory.

Sulphur Dioxide:
Sulphur Dioxide is a major pollutant from aluminium smelters/refineries. Exposure to Sulphur Dioxide via air primarily affects the mucous glands and the lungs. The most common disorders due to the exposure are wheezing and breathing problems. Long-term exposure could result in Asthma and Bronchitis.

Sulphur Dioxide also combines with the moisture and water vapour in the air to form Sulphuric Acid and causes acid rain. Acid rain causes damages to aquatic life, plant life, and also damages buildings and monuments made of limestone.

Carbon Dioxide, CF4, C2F6:
All three gases are greenhouse gases that contribute to global warming and climate change. Greenhouse gases are gases in the atmosphere that absorb heat energy radiated from the Earth. They trap the heat in the atmosphere leading to the warming of the planet and unpredictably altering climate patterns. Global Warming takes place because greenhouse gases surround the earth like a thick blanket and trap the sun's heat and the heat radiated by earth, thus increasing the temperature of the earth. Important greenhouse gases include: water vapour, carbon dioxide, methane, nitrous oxide, ozone, and chemicals containing carbon and halogens – chlorine, fluorine, iodine etc.

CF4 and C2F6 is a perfluorocompound with an atmospheric life of 10,000 years.

Fluorine:
Fluorine emissions result from the fluoride additives used in the aluminium smelters. Fluorine is a pale-yellow to greenish gas with a pungent, irritating odour. It is an extremely toxic, very reactive gas that causes disintegration in almost all other elements except for oxygen and nitrogen.

The main route of exposure is through inhalation. It causes burning sensation in the respiratory tract, cough, sore throat, shortness of breath, irritation of eyes, nose, pulmonary oedema, and liver and kidney damage. Plants are very sensitive to atmospheric fluorides and often are used as bioindicators for the presence of fluorine. Gaseous fluorine also combines with moisture in air and deposit on ponds, lakes and water bodies thus contaminating them. Fluorine finds its way to groundwater by leaching through soil too.

In mammals, absorbed fluorine is retained in dental and bone tissues, and may cause bone atrophy and dental fluorosis, the main symptom of the latter being an orange-brown pigmentation in the teeth. In a particular case study from Canada, farm animals grazing around smelters were found to have ailments of dental fluorosis and bone atrophy.
http://dsp-psd.pwgsc.gc.ca/Collection/H46-2-99-235-2E-10.pdf

Red mud is a waste generated during the extraction of alumina from bauxite. The red mud contains a variety of contaminants like silica, caustic oxides, iron and titanium. While the route of exposure of few of these chemicals is through inhalation, some of them leach into the soil and water and affect the health and the environment.

Dust from red mud could contain significant quantities of the above contaminants whose effects are outlined below.

Silica:
The dust from the red mud contains silica. Exposure to silicon dust causes irritation of eyes, skin, upper respiratory system, and cough. In extreme cases, such exposure causes silicosis -- a painful and often fatal lung disease, where scar tissues are developed in the lungs. Long-term occupational exposure to silica dust may also cause cancer of lungs.

Iron:
Iron is another common contaminant present in the red mud. Iron leaches out into the ground water and gives water a peculiar metallic taste. Its presence in water in large quantities affects the potability of water and also can cause staining of clothing, sinks, and toilets.

Titanium:
Exposure to dust containing Titanium may cause tightness and pain in chest, coughing, and difficulty in breathing. In the long term, it causes other lung-related diseases. Contact of Titanium dust with skin or eyes may cause redness and irritation.

Calcium Oxide:
Calcium Oxides are also present in huge quantities in the red mud waste from aluminium smelters. Calcium Oxide leaches into surface and ground water. Presence of excess Calcium Oxide in water causes hardness in water. The usage of excessively hard water leads to – reduced lathering of soaps, gray staining of washed clothes, scum on wash and bath water following the use of soap and detergent, build up of scales on electric heating elements and boilers and accumulation of whitish-gray scale in kettles and containers used to boil water.

Caustic residues:
Caustic (Sodium) residues are also present in the red mud waste. Skin contact with highly caustic residues can burn the skin. The residues leach into the ground water and elevate sodium and alkalinity of the water. Alkalinity renders the water unpotable, and leads to the formation of salt scales in the vessels that it is boiled in. High levels of Sodium in water are also associated with a higher incidence of hypertension. A community in Jamaica residing near an aluminium smelter suffer form higher incidences of hypertension as a result of increased levels of Sodium in water.

Annexure 2

HISTOLOGICAL STUDY ON THE KIDNEY, GILL AND INTESTINE OF TWO SPECIES OF FISHES COLLECTED FROM THE CONFLUENCE OF EFFLUENT DISCHARGE FROM CHEMPLAST SANMAR GROUP OF COMPANIES INTO THE CAUVERY RIVER.

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Mercury will be accumulated in plants invertebrates, fish and mammals. Concentration will increase in higher trophic level organisms. Uptake and accumulation of mercury are affected by type of mercury present; neutral mercury species ($HgCl_2^0$ and $CH_3 HgCl^0$) are absorbed more efficiently than charged mercury species eg $HgCl^-_3$ $CH_3 Hg^+$ (Mason et al 1996). Tissue concentrations are often positively correlated with organism's length, weight and age.

In fishes, accumulation of heavy metals, especially mercury, occurs through the Gill membranes. Gill takes up aqueous methyl mercury more readily than inorganic mercury (Eisler 1987, Huckabee et al 1979; Boudou et al 1991). Methyl mercury is eventually transferred from gills to muscle and other tissues where it is retained for a longer period of time (Riisgard and Hanson, 1990). Inorganic mercury taken along with food initially accumulates in the tissues of the posterior intestine of the fish. Inorganic mercury is not easily transferred through this organ to other parts of the body. After 15 days, 80 % will be depurated from the fish intestine. Liver and Kidney in fish tend to have higher percentages of inorganic mercury than muscle tissue, though the percentage may vary from organs and even to species (Windon and Kendall 1979).

Methyl mercury ingested in food will be efficiently transferred from the intestine to other organs (Boudon et al 1991). Methyl mercury has been reported to constitute from 70 – 95 % of the total mercury in skeletal muscle in fish (Greib et al 1990: Spry and wiener 1991)
Methyl mercury may be upto 99 % of the mercury present in muscle tissue on a wide variety of both freshwater and salt water fishes (Bloom 1992).

Two species namely *Etroplus maculatus (Pearl Spot)* and *oreochromis mossambica* (*Tilapia*) are considered as the most tolerant in fresh water ecosystem. Both species belong to the family Cichlidae and the former is the native one and the latter is the exotic one. The presence of these two species in the polluted water indicates the tolerant nature of these two species. The following observations are made based on the histological sections of the gill and other tissues from the two species (Photo Plates 1-2). A control figure showing the normal fish is also given (Plate 3).

Study Methodology

A sample each of two species, *Etroplus maculatus (Pearl Spot)* and *oreochromis mossambica* (*Tilapia*), were collected from slowly flowing water downstream of Chemplast's effluent discharge point. Fish diversity was observed both in the reservoir (upstream of Chemplast's discharge point) and downstream of Chemplast's discharge point. The former was determined by studying the fish catch at the landing center on the banks of the reservoir.

Separately, a histological study was performed on the two samples to assess the changes, if any, in the kidney, gills and intestinal tissue of the fish.

General Observations

The fish diversity in the reservoir seems to be healthy. Fish species representing various genera were collected in the reservoir but in downstream of the effluent discharge point appeared to be devoid of dissolved oxygen. These regions are characterized by low or no fish population. Further downstream, where the water is clear, fishermen reported the presence of only a few hardy varieties of fish, primarily Tilapia (Oreochromis mossambica) and Pearl Spot.(Etroplus maculatus).

Changes in Kidney

Histopathological examination of fish kidney is an authentic method of determining the impacts of contaminants in the aquatic environment. Widening of space between the capsule and the Glomerular capillary network, shrinkage of glomerular tuft, rupture of visceral epithelium and evacuation of glomerulus, necrosis of kidney tubules were observed.

Similar observations have been reported in fish upon exposure to various pollutants like Cadmium, Mercury compounds, Malathion, Pesticides like Butachlor, Endosulfan and etc.

Changes in Gills

Apparent increase in the number of mucous cell openings, damaged microridges of gill epithelium, appearance of microvascular system in secondary gill lamellae were noted. Damaged denticles of the fill rakers were found. Conspicuous change is the thickening of soft tissue, which constitutes the gill filament; debris of damaged and dead cells occurred in few places. Pronounced increase in blood supply and multifold increase in erythrocytes were noted. The respiratory epithelium and associate tissues of the gill were reduced in thickness and monocytes were found in large numbers.

Changes in Intestine

Change in structure of intestinal epithelium was the thickening at the wall. The epithelium cell became taller and grew into the lumen as interior folds. These folds grow by the addition of more epithelial cells and the epithelium raised into a number of flat folds with intervening crypts.

In fishes exposed to pollutants like Mercury and Arsenic, these changes are evident.

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Annexure 3

Details of the chemicals found in the Chemplast air sample and its health effects

No.	Chemical Found	Levels Detected	Regulatory Standards	Occupational Limits	Odour	Exposure Routes	Target Organs and Health Effects	Carcinogen
1.	Hydrogen Sulphide	296 ug/m3	296 times above the EPA Region 6 Screening Level	14 ug/m3	Strong odour of rotten eggs	Inhalation, skin and/or eye contact	**Target Organs:** Eyes, respiratory system, Central Nervous System **Health Effects:** Irritation eyes, respiratory system; coma, conjunctivitis, eye pain, discharge of tears, abnormal visual intolerance to light; dizziness, headache, weakness, exhaustion, irritability, sleeplessness; problems related to the stomach	**No**
2.	Carbon Disulphide	19.5 ug/m3	6.5 times above the Texas Long-Term Screening Level	30 ug/m3	Sweet ether-like odour	Inhalation, skin absorption, ingestion, skin and/or eye contact	**Target Organs:** Central Nervous System, Peripheral Nervous System, Cardiovascular System, eyes, kidneys, liver, skin, reproductive system **Health Effects:** Dizziness, headache, poor sleep, weakness, exhaustion, anxiety, weight loss; heart disease; stomach related problem; kidney, liver injury; eye, skin burns; skin diseases; reproductive effects	**No**

No.	Chemical Found	Levels Detected	Regulatory Standards	Occupational Limits	Odour	Exposure Routes	Target Organs and Health Effects	Carcinogen
3.	Vinyl Chloride	470 ug/m3	2100 times above the EPA Region 6 Screening Level	10 ug/m3	Pleasant odour at high concentrations	Inhalation, skin, and/or eye contact (liquid)	**Target Organs:** Liver, Central Nervous System, blood, respiratory system, lymphatic system **Health Effects:** weakness, exhaustion; abdominal pain, gastrointestinal bleeding; enlarged liver; [potential occupational carcinogen]	**Yes** **Cancer Site** [liver cancer]
4.	Ethanol	180 ug/m3	Within regulatory limits	--	Weak, ethereal, vinous odour	Inhalation, ingestion, skin and/or eye contact	**Target Organs:** Eyes, skin, respiratory system, Central Nervous System, liver, blood, reproductive system **Health Effects:** Irritation eyes, skin, nose; headache, drowsiness, weakness, exhaustion, cough; liver damage; reproductive defects.	**No**
5.	Acetone	36 ug/m3	Within regulatory limits	1780 ug/m3	Fragrant, mint-like odour	Inhalation, ingestion, skin and/or eye contact	**Target Organs:** Eyes, skin, respiratory system, Central Nervous System **Health Effects:** Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; skin diseases	**No**
6.	Isopropyl Alcohol	6.8 ug/m3	Within regulatory limits	--	Odour of rubbing alcohol.	Inhalation, ingestion, skin and/or eye contact	**Target Organs:** Eyes, skin, respiratory system **Health Effects:** Irritation eyes, nose, throat; drowsiness, dizziness, headache; dry cracking skin	**No**

No.	Chemical Found	Levels Detected	Regulatory Standards	Occupational Limits	Odour	Exposure Routes	Target Organs and Health Effects	Carcinogen
7.	Methylene Chloride	6.7 ug/m3	1.6 times above the EPA Region 6 Screening Level	--	Chloroform -like odour	Inhalation, skin absorption, ingestion, skin and/or eye contact	**Target Organs:** Eyes, skin, cardiovascular system, Central Nervous System **Health Effects:** Irritation eyes, skin; weakness, exhaustion, drowsiness, dizziness; numbness, tingle limbs; nausea; [potential occupational carcinogen]	**Yes** **Cancer Site** [in animals: lung, liver, salivary & mammary gland tumours]
8.	1-1, Di Chloroethane	26 ug/m3	Within regulatory limits	--	Chloroform -like odour	Inhalation, ingestion, skin and/or eye contact	**Target Organs:** Skin, liver, kidneys, lungs, Central Nervous System **Health Effects:** Irritation skin; central nervous system depression; liver, kidney, lung damage	**No**
9.	n- Hexane	6.8 ug/m3	Within regulatory limits	--	Gasoline-like odour.	Inhalation, ingestion, skin and/or eye contact	**Target Organs:** Eyes, skin, respiratory system, Central Nervous System, peripheral nervous system **Health Effects:** Irritation eyes, nose; nausea, headache; peripheral neuropathy: numb extremities, muscle weakness; skin diseases; dizziness; chemical pneumonitis	**No**

No.	Chemical Found	Levels Detected	Regulatory Standards	Occupational Limits	Odour	Exposure Routes	Target Organs and Health Effects	Carcinogen
10.	Chloroform	32 ug/m3	380 times above the EPA Region 6 Screening Level	50 ug/m3	Pleasant odor.	Inhalation, skin absorption, ingestion, skin and/or eye contact	**Target Organs:** Liver, kidneys, heart, eyes, skin, central nervous system **Health Effects:** Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, weakness, exhaustion; enlarged liver; [potential occupational carcinogen]	**Yes** **Cancer Site** [in animals: liver & kidney cancer]
11.	1,2 – Di Chloroethane	2400 ug/m3	32000 times above the EPA Region 6 Screening Level	--	Pleasant, chloroform -like odour	Inhalation, ingestion, skin absorption, skin and/or eye contact	**Target Organs:** Eyes, skin, kidneys, liver, central nervous system, cardiovascular system **Health Effects:** Irritation eyes; Central Nervous System depression; nausea, vomiting; skin diseases; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]	**Yes** **Cancer Site** [in animals: fore-stomach, mammary gland & circulatory system cancer]
12.	Benzene	6.4 ug/m3	25 times above the EPA Region 6 Screening Level	30 ug/m3	An aromatic odour	Inhalation, skin absorption, ingestion, skin and/or eye contact	**Target Organs:** Eyes, skin, respiratory system, blood, central nervous system, bone marrow **Health Effects:** Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; weakness, exhaustion; bone marrow depression; [potential occupational carcinogen]	**Yes** **Cancer Site** [leukaemia]

No.	Chemical Found	Levels Detected	Regulatory Standards	Occupational Limits	Odour	Exposure Routes	Target Organs and Health Effects	Carcinogen
13.	1,1,2 – Tri chloroethane	8.7 ug/m3	72 times above the EPA Region 6 Screening Level	--	Sweet, chloroform -like odour	Inhalation, skin absorption, ingestion, skin and/or eye contact	**Target Organs:** Eyes, respiratory system, Central Nervous System, liver, kidneys **Health Effects:** Irritation eyes, nose; central nervous system depression; liver, kidney damage; [potential occupational carcinogen]	**Yes** **Cancer Site** [in animals: liver cancer]
14.	Toluene	27 ug/m3	Within regulatory limits	375 ug/m3	Sweet, pungent, benzene-like odour	Inhalation, skin absorption, ingestion, skin and/or eye contact	**Target Organs:** Eyes, skin, respiratory system, central nervous system, liver, kidneys **Health Effects:** Irritation eyes, nose; weakness, exhaustion, confusion, euphoria, dizziness, headache; dilated pupils, discharge of tears; anxiety, muscle fatigue, liver, kidney damage	**No**
15.	Chloro benzene	6.1 ug/m3	Within regulatory limits	350 ug/m3	Almond-like odour	Inhalation, ingestion, skin and/or eye contact	**Target Organs:** Eyes, skin, respiratory system, central nervous system, liver **Health Effects:** Irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; in animals: liver, lung, kidney injury	**No**

No.	Chemical Found	Levels Detected	Regulatory Standards	Occupational Limits	Odour	Exposure Routes	Target Organs and Health Effects	Carcinogen
16.	o-Xylene	16 ug/m3	Within regulatory limits	435 ug/m3	An aromatic odour	Inhalation, skin absorption, ingestion, skin and/or eye contact	**Target Organs:** Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys **Health Effects:** Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; nausea, vomiting, abdominal pain; dermatitis	**No**
17.	1,2,4 – Trimethyl Benzene	5.5 ug/m3	Within regulatory limits	--	Distinctive, aromatic odour	Inhalation, ingestion, skin and/or eye contact	**Target Organs:** Eyes, skin, respiratory system, central nervous system, blood **Health Effects:** Irritation eyes, skin, nose, throat, respiratory system; bronchitis; headache, drowsiness, fatigue, dizziness, nausea, incoordination; vomiting, confusion	**No**
* as per Factories Act, TWA 8 hrs								

INDIAN PEOPLE'S TRIBUNAL ON ENVIRONMENT AND HUMAN RIGHTS

In June 1993, at the National Conference on “Human Rights, Environment and the Law” 400 people comprising lawyers, judges, human rights activists and non-governmental organisations (NGOs) met to share their experience. Disillusioned with the apathy of the judiciary towards human rights and the environment, they decided to campaign for changes in the system. The conference culminated with the setting up of the Indian People’s Tribunal on Environment and Human Rights (IPT) on June 5, 1993. THE IPT is positioned as an alternative "People's Court".

Retired Supreme Court and High Court judges associated with the IPT investigate crucial human rights violations and cases of environmental degradation. These reports are then used by local group to further the campaign and strengthen their struggle. In some cases, a public interest litigation is filed on the basis of these reports to obtain relief for the victims.

OBJECTIVES

- To highlight environment and human rights issues and provide an alternative vision for both, the judiciary and the public.
- To investigate cases of gross human rights violations and environmental degradation and to report, campaign and litigate.
- To highlight the plight of the oppresses, in particular children, women, tribals, slum dwellers, labourers and prisoners, and encourage victim communities to fight for their rights.

KIND OF INVESTIGATIONS UNDERTAKEN BY THE IPT

- Forced evictions due to mega-projects, urbanisation and natural disasters
- People's rights in protected areas
- Atrocities against women
- Attacks on minorities
- Atrocities against Dalits
- Impact of industrialisation/ Mega projects
- State Repression and Police Atrocities
- Environmental Pollution/ Degradation

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The four-member multidisciplinary panel of Indian Peoples Tribunal, headed by Justice (Retd) Akbar Basha Kadri enquired into the alleged environmental and human right violations of two of the major polluting industrial units of Mettur in Salem district of Tamilnadu state. The panel conducted field visits and public hearings, and received several hundreds of written and oral depositions from local people and concerned officials. The present report describes the appalling scenario of indiscriminate disposal and mismanagement of industrial wastes and the resultant devastation of environment and public health at Mettur. The report also brings to light the apathy and callousness with which the agents of the state and industry has dealt with pollution related complaints and issues.

The Panel enquired specifically into several alleged environmental and human right violations by Chemplast Sanmar and MALCO Ltd at Mettur. Chemplast Sanmar's plants including the PVC plant was found to be responsible for severely polluting the water and soil of the area. It was also found that the highly hazardous Mercury wastes were disposed in pits with no secured linings. Dumps of *fly ash* and *red mud* wastes from MALCO on the banks of the Stanley reservoir pose a serious threat to the water security of the entire state.

The Panel came across overwhelming evidence to conclude that the toxic hazardous wastes and other emissions and effluents from the above industries have seriously impacted the ecology, human and animal health, agriculture, livelihoods and socio economic status of Mettur. The panel has recommended immediate remedial action, including provision of clean water for the communities, initiation of health monitoring and remediation, and the constitution of a Local Area Environment Committee including local representatives to oversee pollution-reduction and remediation of contaminated sites, the removal of the MALCO Red Mud dump from the banks of Stanley Reservoir.

Some of the remedial and compensatory measures to revert the environment and public health situation back to its normalcy are suggested and the IPT urges immediate and serious attention from all the concerned authorities to the issues raised and management options suggested in the report.

PANEL MEMBERS

Justice (Retd) Akbar Basha Kadri

Mr. Vijay Kanhere

Prof. Fatima Babu

Dr. P.A. Azeez