Zero Discharge; Zero Truth
Chemplast's Illegal Discharges into the Kaveri

By Community Environmental Monitoring, a program of The Other Media
with assistance from Mettur Padhukaapu Iyakkam & Salem Citizens Forum
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On 4 May, 2011, Chemplast Sanmar was found discharging foul-smelling effluents into a public canal near its PVC plant (Plant II). A sample of the effluent was delivered to Ministry of Environment & Forests-recognised Sargam Laboratories Pvt Ltd on 6 May. Sargam's 21 May, 2011 report containing the Results of Analysis of the effluent sample revealed dangerously high levels of toxic chemicals, including five carcinogens and one brain-damaging chemical.

All chemicals are known either to be used in Chemplast Sanmar or generated during the processes. Mercury, a potent neurotoxin that is known to cause birth deformities and brain damage, was 1.3 times higher in the sample than Indian standards for discharge into inland surface water. Ethylene Dichloride (EDC), a carcinogen and a PVC intermediate that is manufactured onsite, was 10,526 times more than US Environmental Protection Agency criteria for protecting human health for consumption of fish and drinking water. Bis (2-chlorethyl) ether, also a carcinogen, was 283 times higher than the USEPA criteria. Carcinogenic Chloroform was 10.2 times above USEPA criteria. 1,1,2-tricholorethane and methylene chloride, both carcinogenic, were 88 times and 3.2 times above the criteria respectively.

Ethylene dichloride and 1,1,2-trichloroethane exceeded the maximum monthly average standards for effluents, with the former exceeding standards by 22.2 times, and the latter by 1.6 times.

Acting on a telephone complaint, the Assistant Environmental Engineer of Tamilnadu Pollution Control Board, Salem, inspected the factory and effluent discharge on 5 May, 2011. TNPCB's inspection report reportedly gives the company a clean chit stating that no illegal diversion of wastewater was noticed. Although a sample was taken by the TNPCB, this was not included as part of the inspection report. An RTI response received from the District Environmental Engineer on 17 June, 2011, revealed that the sample had not been analysed until the time of writing.

Sargam's result of analysis raises significant concerns on three counts. First, the discharge of untreated effluents into a public canal belies the company's claim of having adopted “zero discharge” technology. Second, the TNPCB, which is meant to act in the interests of public health and environment, has submitted a report exonerating the company while the current results of analyses clearly implicate the company as the source of toxic pollution. This raises questions about the integrity of the TNPCB officials vested with regulating Chemplast and other industries in Salem district. And finally, the stream carrying the company's effluents empties into the River Kaveri upstream of several drinking water projects, including for Salem, Athur, Omalur, Mecheri, PN Patti, Veerakalpudur, Gonur, Karuppureddiyur, Nangavalli, Kolathur and the Pulampatti scheme. The stretch between the dam and the Chekkanur Barrage is also used as a source of fish. Through the processes of bioaccumulation and biomagnification, chemicals such as mercury tend to accumulate in the bodies of fish and magnify several thousand-fold as one moves up the food chain posing a serious threat to fish consumers. The continued discharge of toxic chemicals into a river that is used as a source of fish and drinking water is very disturbing.

While even one-time discharges of such chemicals into a source of drinking water and fish should be cause for concern, villagers claim that such discharges are routine immediately after rains. The company is also known to have disposed its effluents through its old pipelines and other means well after it publicised its claims of zero discharge.

In November 2007, the company first claimed that all its units in Mettur were to go “zero discharge” from January 2008. Chemplast Sanmar managing director, P.S. Jayaraman is quoted by *The Hindu* as saying the company had invested Rs. 150 crore, over the last five years, to address environmental issues. “Currently, we are discharging 1,425 kilo litres per day (kld) of water, and this would come

down to zero from January," he told *The Hindu*.[1]

In December 2010, the Confederation of Indian Industry awarded the company two awards – for "Innovative Case Study" and "Excellent Water Efficient Unit" – for its case study on zero discharge. In a press release announcing the awards, the company claims that it has not discharged a drop of treated water since September 2009.[2]

Treated water may not have left the company premises. But untreated water seems to have on several incidents, if local reports are anything to go by.

Table 1: Major Incidents of Violations of Zero Discharge Reported by Local Residents to TNPCB

Date	Incident	Comment
10/02/08	Underground pipeline belonging to Chemplast Sanmar was damaged during construction work at a new Railway Station. This led to an effluent spill	Railway authorities complained to Chemplast. Chemplast sent a team to repair the damaged pipeline.
11/03/09	A chemical tanker originating from Chemplast Sanmar was found discharging its contents into a water body behind Karumalaikoodal Police Station.	Chemplast Sanmar's plants were operating without a valid license at the time.
14/8/2009	Acting on the complaint of villagers, the Assistant Environmental Engineer, TNPCB, verified allegations of illegal discharge of untreated effluents by Chemplast. The TNPCB's spot check revealed that Chemplast was discharging toxic effluents through a pipeline directly into the Kaveri. The TNPCB also confirmed that Chemplast Plant II was discharging untreated effluents into a public canal that emptied into the River Kaveri. This sample was taken at the same spot where the current sample of May 4, 2011, was taken.	Subsequent to this, Chemplast changed its earlier claim of zero discharge since January 2008 to zero discharge since September 2009.
25/11/2009	200 coconut saplings in Panangadu Pudhu Colony wither away due to effluent contamination from Chemplast's Plant III following rains.	

Earlier analyses of sediment and wastewater respectively from the same spot by Community Environmental Monitoring (2007) and TNPCB (2008) confirm the presence of some of the same toxic

1 "Chemplast Sanmar Plans to Discharge Zero Waste Soon." The Hindu. November 20, 2007. http://www.hindu.com/2007/11/20/stories/2007112055030500.htm

2 "Chemplast Sanmar wins CII Water Awards." 13 December, 2010. Press Release, Chemplast Sanmar Ltd. http://chemplastsanmar.co.in/images/news/CSL_Water_Award_Press-Release.pdf

chemicals found in the May 2011 sample. All five organic compounds found in the May 2011 sample from near Chemplast's PVC factory were also found in the 2007 sample of effluents released by Chemplast's PVC plant into the River Kaveri. **(See Table 3).**

Table 3: Effluent Sample from "Piped effluent outfall from PVC Plant discharged into the surplus course of River Kaveri" July 2007.[3]

Findings: 38 chemicals found; 6 chemicals above standards

Name	**Value ug/litre**	**Standard**	**No of times above standard**	**Carcinogen**
1,2-dichloroethane	1260	World Health Organisation	82	Yes
Bis(2-chlorethyl)ether	136	US EPA safety standard for consumption of fish caught near pool	257	Yes
1,1,2-Trichlorethane	50.50	USEPA safety standard for consumption of fish caught near pool	3.15	Yes
1,2-Dichlorobenzene	2460	USEPA safety standard for consumption of fish caught near pool	65	No
Benzene	14.6	World Health Organisation	1.5	Yes
Vinyl chloride	164	World Health Organisation	546	Yes

A composite sample taken of soil and sediment taken in 2007 from two rainwater drains, including the spot from where the current effluent sample was taken, was found to contain 6.7 nangogram/kg of total dioxins and furans. This is at least 8 times higher than Canadian interim sediment quality standards of 0.85 ng/kg. Dioxins and furans belong to a category of chemicals known to contain some of the most toxic chemicals known to science.

The Tamilnadu Pollution Control Board has failed in its responsibility to safeguard the environment and protect public health. Not only that, it has cleared Chemplast Sanmar's name with regard to the allegation of illegal effluent discharge without even analysing the effluent sample collected by the Assistant Environmental Engineer. This raises questions about the integrity and neutrality of TNPCB.

Keeping in mind the sensitivity and importance of the Kaveri, we demand the following of the TNPCB head office:

1. Conduct an immediate enquiry into the report of the TNPCB DEE and AEE, and take disciplinary action against them if the report is found to be unscientific and baseless.
2. Take legal action against Chemplast for discharging toxic effluents into the Kaveri.

3 Extracted from "Unfolding Disaster: A Study of Chemplast Sanmar's Toxic Contamination in Mettur." October 2007. Community Environmental Monitoring & Corporate Accountability Desk, programs of The Other Media.

3. Prosecute its directors for violating the Water Act and the Environmental Protection Act, 1986.
4. Take steps to prevent any further discharge into the Kaveri, and to remediate damage already done.

Toxicological Profiles of Chemicals Found

Mercury is toxic to aquatic animals and is persistent in the environment. Contaminated fish consumption is the most common route of exposure to methyl mercury, the most toxic form of mercury, in humans, as it binds tightly to the proteins in fish tissue and also accumulates as it passes through the food chain. In humans, it is absorbed readily into the blood and distributed to all tissues including the brain. Once it enters the brain, it changes to a form that cannot leave the brain easily. It also readily passes through the placenta to the foetus and foetal brain, thereby affecting the unborn child.

Acute exposure to toxic amounts of elemental mercury can cause symptoms like vision and hearing disturbance, dizziness, nausea, vomiting, and respiratory problems. Long term exposure to the various forms of mercury is known to cause emotional disturbance, nervous tremors, dental problems, skin disorders and kidney injury. Mercury is a neurotoxin and affects the central nervous system. Children exposed to mercury show symptoms of mental retardation, sensory disturbances and neuro-behavioral changes.

Bis (2-chloroethyl)ether (carcinogen):
Bis(2-chloroethyl)ether is a colourless, non-flammable liquid with a strong unpleasant odor. It does not occur naturally. Bis(2-chloroethyl) is made in factories, and most of it is used to make pesticides. Some of it is used as a solvent, cleaner, component of paint and varnish, or as a chemical intermediate to make other chemicals.

Breathing low concentrations of bis(2-chloroethyl) ether will cause coughing, and irritation to nose, eyes, skin, throat and lungs. In some cases, damage to the lungs can be severe enough to cause death. The USEPA has classified this chemical as a Group B2, probable human carcinogen.

1,1,2-Trichloroethane (carcinogen):
1,1,2-Trichloroethane is a colorless, sweet-smelling liquid. 1,1,2-Trichloroethane is not known to occur as a natural product, It is used to make vinylidene chloride which is in turn used to make synthetic fibers and plastic wraps such as the saran wrap. 1,1,2-Trichloroethane is sometimes present as an impurity in other chemicals, and it may be formed when another chemical breaks down in the environment under conditions where there is no air.

Most 1,1,2-trichloroethane released into the environment will go into the air and it breaks down slowly in air. 1,1,2-Trichloroethane may enter the groundwater by filtering through the soil and also appears to stay in water for a long time; it takes years for it to break down.

Breathing outdoor air that contains it from industrial releases or air near hazardous waste site, drinking contaminated water are the common routes of exposure to 1,1,2-trichloroethane.

Physical contact with 1,1,2-trichloroethane can result in stinging and burning of the skin. The only effect that has been noted in humans is stinging and burning sensations of the skin upon dermal exposure to the chemical. Acute animal studies have reported effects on the liver, kidney, and central nervous system (CNS) from inhalation and oral exposure to 1,1,2-trichloroethane, while chronic animal studies have reported effects on the liver and immune system from oral exposure. USEPA has classified 1,1,2-trichloroethane as a Group C possible human carcinogen

Ethylene Dichloride (carcinogen):
Ethylene Dichloride (EDC) is a manufactured chemical that is not found naturally in the environment. It 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. An explosive accident involving EDC can result in Bhopal-like disasters because of the tendency of explosion by-products like hydrogen chloride and phosgene to form clouds and spread far and wide.

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.

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 stomach, mammary gland and blood.

Chloroform (carcinogen):
Chloroform is a heavy, colourless, non-flammable liquid with a sweetish burning taste and a pleasant, sweet, ethereal odour. It is a naturally-occurring chemical, but most of the chloroform in the environment is man-made. It was used as an anaesthetic in the past, but the US Food and Drug Administration banned its use in 1976 after it was found that chloroform is a potential carcinogen. Most of the chloroform released in air breaks down eventually, but it is a slow process. The breakdown products in air include phosgene and hydrogen chloride, which are both 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.

One is most likely to be exposed to chloroform by drinking water and breathing indoor or outdoor air containing it.

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. USEPA has classified chloroform as a Group B2, probable human carcinogen.

Methylene Chloride (carcinogen):
Methylene Chloride is a colourless liquid with chloroform like odour which does not occur naturally in the environment. Methylene chloride is mainly released to the environment in air. It does not easily dissolve in water, but small amounts may be found in drinking water. Methylene chloride is mainly released to the environment in air, and to a lesser extent in water and soil, due to industrial and consumer uses.

Methylene chloride may enter your body when you breathe vapors of contaminated air. It may also enter your body if you drink water from contaminated wells, or it may enter if your skin comes in contact with it.

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.