

BEFORE THE HONOURABLE NATIONAL GREEN TRIBUNAL

CHENNAI

Original Application No.262 of 2017 (SZ) &

M A No. 215 of 2017 (SZ)

Appellant : K K Muhammed Iqbal

Versus

Respondents : The Kerala State Pollution Control Board & Others

**REPORT FILED BY THE COMMITTEE CONSTITUTED BY THE HON'BLE TRIBUNAL
AS PER THE ORDER DATED 20.01.2020 IN THE ABOVE APPLICATION**

Standing counsel for the 1st respondent

**Rema Smrithi. V. K., Advocate
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**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
SOUTH ZONE, CHENNAI**

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Dated this the 17th day of November, 2021.

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VOLUME – II

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TRIBUNAL AS PER THE ORDER DATED 20.01.2020 IN THE ABOVE

APPLICATION

We the Committee constituted by the Hon'ble National Green Tribunal vide order dated 20.01.2020 in O.A.No.262 of 2017. We know the facts and circumstances of the case. The factual submission made here under is true and correct to the best of our knowledge, information and belief. In these circumstances, it is just and necessary that this Honourable Tribunal may be pleased to accept the accompanying report as submitted by the committee constituted by the Honourable Tribunal and it is so humbly prayed in the interests of justice in this case.

1.0 Honourable NGT directions

The Joint Committee was constituted by the Honourable National Green Tribunal vide order dated 20.01.2020 in O.A.No.262 of 2017. In line with the honourable NGT order dated 20-01-2020, the three-member joint committee was formed and was assigned with the following directives:

- ***To inspect the industrial clusters of Eloor, Edayar region regarding the efficiency of ETPs and CETPs in operation and also to observe the details of sewage discharge from the industrial clusters of Greater Kochi area which are discharging it into the river Periyar. Along with which the water quality of river Periyar and the status of implementation of ZLD facility by the industries in the region and its efficacy assessment so as to ensure all effluent that is generated gets recycled without discharging the same into river Periyar.***
- ***Consideration of the question on damage to environment caused on account of the violation committed by Sreesakthi Paper Mills Ltd for non-disposal of the plastic waste generated by them and keeping it in their premises for a long period and to assess the environmental compensation as per the guidelines given by the Central Pollution Control Board in this regard.***

Though, the assessment of efficiency of the ETPs, CETPs and implementation of ZLD in the industrial clusters of Greater Kochi along the banks of river Periyar was a major activity of the committee as per the order dated 20.01.2020; the activity of the joint committee was later limited/ restricted to the dumped plastic waste by M/s. Sreesakthi Paper Mills, in an order dated 29-01-2021 in this matter. As per the directions, the joint committee exclusively investigated the question of potential environmental damage caused/ inflicted by the violation committed M/s. Sreesakthi Paper Mills and to impose appropriate environmental compensation for the violation committed by the industry.

2.0 About the industry M/s. Sreesakthi Paper Mills Ltd., IDA, Edayar, Ernakulam.

M/s. Sreesakthi Paper Mills Ltd., was a craft paper manufacturing unit situated in the Industrial Development Area (IDA), Edayar, Ernakulam in the state of Kerala. The industry was established in the year 1992 with one unit (Unit-1) and later expanded production by

establishing another unit (Unit-2) in the year 2006. The industry was engaged in the manufacturing of craft paper by recycling waste paper and cardboard boxes. The production capacity of unit-1 at the time of establishment was 900-950 tons per month and KSPCB had granted permission for discharging 100 KLD of treated effluent into river Periyar with specific conditions. The following consents to establish (CTE)/ consents to operate (CTO) were issued by KSPCB for applications received from Sreesakthi Paper Mills Ltd.

- Consent was issued in the year 2007 during its renewal for increasing the production capacity of unit I to 1500 tons/month (TPM)
- CTE was issued to unit 2 in the year 2006 for a production capacity of 70,000 tons per annum (TPA).
- Consent was also issued in the year 2007 to establish an incinerator with a capacity 400 Kg/day for disposing the plastic waste generating from the process
- CTO was issued to unit 2 in 2007 (with capital investment 20 crores and production capacity 70,000TPA) with the consent condition to attain zero discharge before 31/12/2007.
- CTE for expansion was issued for the installation of 22TPH power boiler for Captive Power Plant (CPP) of 48 MW/day capacity on 29/11/2011 with a validity up to 31.08.2014. The water consumption rate of the CPP was 20 KLD.

The raw materials used in the manufacturing of craft paper were old cartons boxes and waste paper which were collected from both local market and imported from different countries. The consented water consumption limit imposed on the industry was 300KLD. The pollution control measures/ devices provided by the industry during its operation phase were:

- ETP for the treatment of trade effluent generated
- Cyclone dust separator with 30 m stack provided for CPP boiler
- Wet scrubber cum quenching facility to the 30m stack connected to the incinerator
- Acoustic enclosure with adequate stack height for DG sets

The industry was situated in 8.75 acres of land and about 81 cents of land were utilized for dumping plastic waste, incinerator ash generated from the processes. The solid waste

generated from the unit contained steel clips, stapler pins, plastic wastes including plastic labels, plastic laminations, sacks and other plastic wastes. The other wastes generated from the industry were ETP sludge, ash from the captive power plant and incinerator. Waste oil and incinerator ash generated from the industry were brought under the ambit of hazardous wastes. The waste management were done as per the following:

- ETP sludge was disposed through the common TSDF M/s. KEIL, Kochi
- Incinerator waste was dumped in the unit premise/plot.
- The plastic wastes generated were disposed through the conventional type incinerators installed and later it was sent to co-processing in cement units.
- Later the plastic waste was disposed to TSDF, M/s. KEIL, Kochi as per the order of the Hon'ble High Court in the matter of WP(C) 5803/2017.

As per the directions of Honorable High Court of Kerala, the plastic wastes were removed from the site. The quantum of plastic waste removed and disposed to the common TSDF (M/s. KEIL, Kochi) is enclosed herewith and marked as **ANNEXURE R1(a)**. The reclaimed area is in the process of converting to a parking space for warehouse operated M/s. Cella Space currently established in the location for industrial/ warehousing/ logistics purposes. Consent to Establish (PCB/ESC/IC/CE-50/2019) was issued to the above unit on 09.11.2019 (valid up to 23.10.2024) and subsequently consent to operate (PCB/ESC/CO/IC-64/2020) was issued on 24.11.2020 (valid up to 31.10.2025). The area in which plastic waste was dumped is now in the process of converting into a parking area of M/s. Cella Space after the removal of dumped plastic wastes.

3.0 Joint Committee meetings and site investigations

The first joint committee meeting and site inspection was carried out on 19.02.2020. In the meeting, decision was taken to collect soil sample to assess the extent of plastic wastes still present in the site. On 19.02.2021, the Joint Committee inspected the site and collected soil samples from the site where plastic was previously dumped. On the day of inspection, it was observed that plastic was spread over the plot and site preparation activities were already initiated to convert the plot into a parking area for trucks. On investigation, it was found that plastic wastes were still present in the soil on the surface and within 1 feet depth. Surface/ top

soil samples were collected for the analysis of plastic (*ANNEXURE-PHOTOGRAPHS*). Soil samples were segregated by progressive sieving of soil samples and were sent to Central Institute of Petrochemical Engineering and Technology (CIPET) on 20.02.2021 for analysis. Weight by weight percentage of plastic present in the soil samples collected is summarized in table: 1.

Table 1: Quantification of plastics in soil samples

<i>S. No</i>	<i>Sample ID</i>	<i>Total sample weight (Kg)</i>	<i>Weight of Plastic (mg)</i>	<i>Plastic content (mg/ Kg)</i>	<i>% Plastic</i>
1	SR1	1.1	90,000	81,818	8.18
2	SR2	2.03	10,000	4926	4.9
3	SR3	1.6	5,000	3125	3.1
4	SR4	1.1	90,000	81,818	8.18

Qualitative assessment of samples using Fourier Transform Infrared Spectroscopy (FTIR) and Differential Scanning Calorimetry (DSC) for confirming the presence of plastic in the soil was carried out. As per the analysis of soil samples, the soil is contaminated with Poly Ethylene (PE), Poly Propylene (PP) and Polyethylene Terephthalate (PET) particles/ crumbs. Details of the analysis is given in table: 2 and the analysis result from CIPET is enclosed herewith and marked as **ANNEXURE R1(b)**. The analysis of soil samples confirmed the presence of plastic particles/ crumbs in the soil samples taken from the plot.

Table 2: Qualitative assessment/ identification of plastics in soil samples

<i>S.No</i>	<i>Sample ID</i>	<i>Test Method</i>	<i>Result</i>
01	SR-1 (Coarse Particles)	ASTM D 3418 & ASTM E1252	Polyethylene (PE) Polypropylene (PP) Polyethylene Terephthalate (PET)
02	SR-1 (Fine Particles)		Polyethylene Terephthalate (PET)

Once, the presence of plastic waste in the soil was confirmed, the Joint Committee carried out the second phase of soil sampling in the areas adjacent to the Periyar River where site preparation activities was yet to start. Soil samples were collected up to three feet depth at 5

different locations using powered earth augur driller. Photographs of the same is enclosed herewith and marked as **Annexure R1(c)**. The soil samples collected were assessed for the extent of plastic wastes by progressive sieving and separation of plastic materials. The macro plastics present in the soil samples was quantified on the basis of percentage (weight/weight). The details of soil investigation are presented in table: 3. Average plastic quantity estimated in the soil sample is 21883.65 mg/ Kg of soil.

Table 3: Assessment of plastics in the soil samples collected from the plot

<i>Samples</i>		<i>Sampling Coordinates</i>	<i>Bulk Density (Kg/m³)</i>	<i>Total Weight (Kg)</i>	<i>Weight of Plastic (mg)</i>	<i>Plastic (mg/kg)</i>	<i>% Plastics in the Samples</i>
<i>ID</i>	<i>Depth (Ft)</i>						
SS1	1	10° 04' 44.0" N	810.5	0.54	2818	5218.51	0.52
SS1	3	76° 18' 53.6"E	953.7	0.56	NIL	NIL	NIL
SS3	1	10° 04' 43.9" N	808	0.42	5395	12845	1.28
SS3	2	76° 18' 53.4"E	360.5	0.25	35000	140000	14
SS4	1	10° 04' 43.8" N 76° 18' 53.4"E	942.4	0.64	NIL	NIL	NIL
SS5	1	10° 04' 43.4" N	564.6	0.40	NIL	NIL	NIL
SS5	3	76° 18' 52.6"E	572.15	0.26	NIL	NIL	NIL
SS6	3	10° 04' 44.9" N 76° 18' 53.7"E	1010	1.4	23808	17005.71	1.7
<i>Average quantity of plastic in the soil</i>						<i>21883.65 mg/ Kg</i>	

Based on above sampling, analysis and assessment, it is confirmed that three types of plastic materials (PE, PP and PET) are still present in the soil as a contaminant. The plastic still present in the site is quantified as illustrated in table: 4.

Table 4: Estimated total weight of plastic remaining in the site

<i>S.No</i>	<i>Particulars</i>	<i>Calculations</i>
1	Total contaminated area= 78 cents	3156.66 m ² (78 x 40.47)
2	Average depth	3 ft = 0.91 m
3	Total volume of contaminated soil	3156.66*0.91=2872.56 m ³
4	Average Bulk density	752.73 kg/m ³
5	Weight of the contaminated soil (Volume x Average Bulk density)	2872.56 x 752.73 (21,62,262.09 Kg)
6	Average Plastic Content in the soil	21883.65 mg/Kg
7	Estimated total weight of the plastics	47.318 Tons

6.0 Assessment of environmental damage/ cost of plastic pollution

One of the directives of the honourable NGT is to consider the question on damage to environment caused on account of the violation committed by Sreesakthi Paper Mills Ltd for non-disposal of the plastic waste generated by them and keeping it in their premises for a long period. Unmanaged or poorly managed plastic wastes have serious implication on the environment. Environmental damages due to specific anthropogenic activities have far reaching effects on various habitats and ecosystems and also impair human's consumer & non-consumer values. Environmental damages significantly vary in terms of the damage's space, scope, level and magnitude. Due to this, significant indices or markers of environmental damage differ considerably and one of the initial steps of environmental damage assessment is to determine the unique indices or markers which help assess the actual damage. However, due to the complicated conception of ecosystems, it would be a daunting task to understand and assess the extent of environmental damages. In most of the cases, the baseline indices and markers required to envisage the extent of environmental/ ecological/ social costs are not available for the accurate assessment of environmental damages and often the assessment has to be done on 'notional' basis under the ambit of 'polluter pays principle'.

As per the European Parliament study (The environmental impacts of plastics and micro-plastics use, waste and pollution: EU and national measures, 2020), the inherent economic impact due to plastic waste is very vast, with an estimated economic damage to the global

marine ecosystems surpassing € 11 billion. The study also put forth that, in Europe, € 630 million are spent every year to clean plastic waste from coasts/ beaches, while the failure to recycle costs to the European economy is € 105 billion. According to WWF (World Wide Fund for Nature) International's report (Plastics: The costs to society, the environment and the economy; 2021), the impacts of plastic pollution, generate significant costs for society and these costs are not accounted in plastic's market price. The lifetime cost of the plastic produced in 2019 will be at least US\$3.7 trillion (+/- US\$1 trillion) and is more than the GDP of India.

Since the introduction of plastic and its industrial production, the volumes of plastics produced have outpaced those of almost any other material. However, the characteristics that render plastics highly desirable are also those that render them ubiquitous and persistent in the environment, as a large fraction of plastics is designed to be discarded almost immediately after their use. Studies shows that, only 9% of all the plastic ever manufactured has been recycled and most of the plastic waste ends up in landfills and, ultimately, in the environment. Most plastics do not degrade, instead, they slowly fragment into smaller particles, referred to as micro plastics, and, further disintegrate into nano-plastics. These plastic particles, have profound detrimental consequences for ecosystems, biota, and the environment, but also for the economy and human health.

As per the European Union study for Policy Department for Citizens' Rights and Constitutional Affairs Directorate-General for Internal Policies (The environmental impacts of plastics and micro-plastics use, waste and pollution: EU and national measures, 2020), approximately two-thirds of all plastic ever produced has been released into the environment, where it continues to impact ecosystems as it fragments and degrades. Only a small fraction of plastic waste is recycled and plastic recycling is considered as an expensive process owing to the inherent complexities of collection, transportation, processing, and re-manufacturing. These considerable costs in combination with the low commercial value of recycled plastic on the one hand and the low cost of virgin polymers on the other seldom renders the recycling process profitable and often requires huge subsidies to sustain.

Improper handling/ disposal of plastic waste/ process sub-products/ raw materials leads to the formation of primary micro plastics and over the period of time secondary micro plastics are generated from the plastic litter/ waste dumps/ or by the abrasions in landfill or dumpsites. In the case of plastics, the term “end of life” does not equate to “end of impact” and the waste plastic materials persist and pollute long after their intended use. Now it is well established that there is no such thing as “end of life” for plastics and depending on how plastic is handled, it may pose a significant threat to the environment and to the climate when it reaches the waste phase of its life-cycle. WWF International in a report (Plastics: The costs to society, the environment and the economy; 2021) provided an overview on the quantifiable and non-quantifiable costs imposed by the plastic lifecycle. As per the report, the cost imposed by plastic on account of market production cost and waste management are currently quantifiable. However, the cost of greenhouse gas (GHG) emissions from plastic and unmanaged plastic wastes have both quantifiable and unquantified elements. But the cost of plastic imposed on health are currently unquantified.

In this specific matter, it is the issue of unmanaged plastic waste on the banks of river close to the estuarine/ brackish water ecosystem and the quantifiable cost elements are:

- Lost ecosystem service costs of estuarine/ coastal/ marine plastic pollution paid for indirectly by governments and all other stakeholders, given the environmental and economic consequences.
- Revenue reductions from fisheries and tourism as a result of estuarine/ marine plastic pollution.
- Clean-up costs, containment, remediation activities and restoration cost.

The unquantifiable cost of unmanaged plastic waste is on account of lost ecosystem service costs of plastic pollution on terrestrial ecosystems (any ecosystems which are found on land including rainforests, deserts, and grasslands). In this case, this aspect may not be significant since, the polluted/ contaminated site is in notified industrial area. However, there are chances of spillage and carry forward of plastic particles from the site to the river, then to the estuarine/ brackish water system and ultimately to the marine environment.

In the WWF International's report on 'Plastics: The costs to society, the environment and the economy; 2021, the GHG emissions from end-of-life processes per tonne of plastic waste is estimated as ~0.53 tonnes of CO₂^e(Carbon dioxide equivalent) per tonne of waste generated. Associated cost of carbon from GHG is estimated as \$ 100.00 per tonne. In another landmark study, the social cost of carbon associated with GHG emissions for India is estimated as \$ 86.00[@] per tonne of CO₂.The plastic waste management cost is estimated as \$ 125.68* per tonne of waste as per the WWF's report. All the cost estimates are based on the 2019 US consumer price index (CPI). To adopt the above cost factors, it is required to relate the above to the Indian consumer price index. It is suggested that the cost estimates of various factors/ elements based on US CPI shall be related in terms of corresponding Indian CPI. The US consumer price index as on July, 2021 is 273.012 point (<https://tradingeconomics.com/united-states/consumer-price-index-cpi>) and corresponding CPI of India was 162.9 points(<https://tradingeconomics.com/india/consumer-price-index-cpi>). For the assessment of potential environmental damage/ cost of plastic pollution, the above cost factors are adjusted to Indian CPI and are summarized in table: 5.

Table 5: Cost elements adjusted to Indian CPI for the assessment of damage.

No.	Cost element	Estimated cost/ ton	Adjusted to Indian CPI
1	Cost of proper plastic waste management	\$ 125.68*	\$ 74.99 ¹
2	GHG emissions from end-of-life plastic waste.	\$ 100.00*	\$ 59.66 ¹
3	Social cost of carbon emission	\$ 86.00 [@]	India specific cost [@]
4	Unmanaged plastic waste: Ecological cost	\$ 3300.00 [#]	\$ 1,969.03 ¹

CPI: Consumer Price Index
¹ Cost adjusted to Indian consumer price index (CPI) as on July 2021.
* *Plastics: The costs to society, the environment and the economy; published in September 2021 by WWF – World Wide Fund for Nature (Formerly World Wildlife Fund), Gland, Switzerland.*
[@] *Country level social cost of carbon, Katharine Ricke, Laurent Drouet, Ken Caldeira and Massimo Tavoni, Nature Climate Change, Vol 8, October 2018, <https://doi.org/10.1038/s41558-018-0282-y>*
[#] *Global ecological, social and economic impacts of marine plastic. Beaumont N J,*

Margrethe Aanesen, Melanie C. Austen, Tobias Börger, James R. Clark, Matthew Cole, Tara Hooper, Penelope K. Lindeque, Christine Pascoe, Kayleigh J. Wyles. Marine Pollution Bulletin, Volume 142, 2019, Pages 189-195, ISSN 0025-326X, <https://doi.org/10.1016/j.marpolbul.2019.03.022>

Based on the above cost factors, indicative environmental damage/ cost of plastic pollution was estimated as summarized in table: 6. The quantifiable cost factor with respect to the market price of plastic waste was not considered as the plastic waste dumped is a waste by-product of kraft paper making process and hence the market price of plastic is not imposed. Cost of plastic pollution on account of health is unquantifiable due to lack of baseline data and relevant health data. The clean-up/ containment cost on account of unmanaged plastic waste may be waived as the proponent is developing a concreted parking space in the site and if the construction is properly engineered to contain the remnant plastic in the site. Revenue reduction with respect to unmanaged plastic waste was not quantified as the site is in notified industrial area and due to lack of relevant data on revenue reduction from tourism and fisheries. The environmental damage/ cost of plastic pollution on account of GHG emissions from end-of-life plastic waste has been estimated to be \$ 59.66¹, however, India specific social cost of carbon was put forth (\$ 86.00[®]) recently and it is more appropriate to impose the social cost of carbon for the estimated GHG emissions in this scenario.

Table 6: Indicative Environmental Damage Cost due to plastic pollution

No.	Cost element	Unit cost	Estimated quantity	Damage/ Cost adjusted to Indian CPI
1	Cost of proper plastic waste management	\$ 74.99 ¹	47.32 Tons	\$ 3,548.53 Rs. 2,61,455.45
2	Social cost of carbon on account of GHG emissions from end-of-life plastic waste.	\$ 86.00 [®]	47.32 Tons (0.53 tons of GHG/ ton of plastic waste). Total GHG emissions 25.08 tons.	\$ 2156.85 Rs. 1,58,916.38
3	Unmanaged plastic waste: Ecological cost	\$ 1,969.03 ¹	47.32 Tons	\$ 93,174.50 Rs. 68,65,097.13
Cost of plastic pollution/ environmental damage: Rs. 72,85,468.96				
US \$ Exchange rate Rs. 73.68 as on 20-09-2021.				
CPI: Consumer Price Index				
¹ Cost adjusted to Indian consumer price index (CPI) as on July 2021.				
[®] Country level social cost of carbon, Katharine Ricke, Laurent Drouet, Ken Caldeira and Massimo Tavoni, <i>Nature Climate Change</i> , Vol 8, October 2018, https://doi.org/10.1038/s41558-018-0282-y .				

The estimated environmental damage/ cost of plastic pollution was limited to the phase after the removal plastic waste from the site. The environment damage cost of historic plastic pollution due to waste plastic dump in the site and the river is not considered as relevant data on the quantity of waste dumped and the quantum of plastic reached river and adjoining estuary is not available. The joint committee is of the opinion that the environmental damage/ cost of plastic pollution owing to the accumulation of plastic waste in the site from the inception of the industry could not be assessed due to paucity of relevant data. There are no records on the daily generation of plastic waste, the quantum of waste incinerated, daily dumping rate in the dump site and the possible carry over to the river during monsoon period. Since the requisite data are not available, the committee has not ventured in to the environmental damage footprint of the past accumulation/ dumping of plastic waste in the site adjacent to the river. Relevant data and baseline indices are lacking for the quantification of revenue loss/ reduction on account of fisheries and tourism in the affected river and estuary. Thus the cost of plastic pollution with respect to the above are not quantified.

The proponent is in the process of converting the site as a parking lot with impervious concrete/ bitumen surface with compound wall. However, if the proposed construction can be done under the supervision of expert agency and other competent authorities with the objective of containing the contaminated soil and prevent further flow of plastic contaminated soil into the river, the calculated environmental damage/ cost of plastic pollution due to remnant plastic in the site can be utilized/ earmarked for this activity. Authorities have to review the engineering aspect and has to make sure that the construction will secure the site and prevent further flow of contaminated soil into the river without disturbing the natural drainage pattern of the site and without compromising river's flood plain zone.

It was also reported that the incinerator ash was disposed in the dump site for several years and there could be possible contamination of soil on account of heavy metals and other organic contaminants. A detailed study is warranted on the contamination status of soil with respect to heavy metals and other organic contaminants as per the schedule II of HWM Rules, 2016 or as per the Guidance Document for Assessment and Remediation of Contaminated Site in India, issued by MoEF & CC. During the investigations, the project proponent carried out works in the site and the Joint Committee could not carry out extensive soil sampling to

assess the extent of contamination in the site. The COVID-19 pandemic situation also hindered the sampling and inspections. It was learnt that the project proponent has carried out a third party study on the possible contamination in the site through the CSIR institute NIST, Thiruvananthapuram.

Though the above proposed damage calculation was discussed in detail by the committee, representative of NEERI has insisted on recording his views that in consideration of the facts and limitations, most attainable solution is to impose penalty rather than environmental compensation on the unit by the statutory bodies KSPCB/ CPCB in terms of violation caused for unplanned and negligent waste management in its premises. The NEERI representative is also of the opinion that the aspect of environmental damage shall be quantified scientifically in terms of facts and data and only after that, the damage cost calculation part may be proceeded. The detailed note by the NEERI representative on his views on the limitations to the existing scenario on environmental damage assessment for the alleged plastic waste storage is enclosed herewith and marked as **Annexure R1(d)** and the para wise justifications to the note by the other committee members are enclosed herewith and marked as **Annexure R1(e)**.

7.0 Assessment of Environmental Compensation (EC)

As per the records available, the industry violated consented conditions on several occasions and there were several complaints raised against the industries on the grounds of pollution especially about the heaped up plastic garbage/ dump. The joint committee proposed to assess the environmental compensation (EC) from the date of issue of first notice for the removal of plastic dump. First notice was served by KSPCB to the unit on 29.11.2016 for removing the heaped plastic garbage from the premises and removal of plastic waste initiated by M/s. KEIL was on 01.09.2018 only after the intervention of Honourable High Court of Kerala. Thus number of days of violation after serving notice and the first action on removing the waste are 641 days. M/s. KEIL completed the removal of plastic dump on 01.03.2020 and the number of days between the serving notice and completion of transportation/ disposal of plastic waste to common TSDF are 1188 days (Table: 7). Even after the notice, the industry has not taken any action on the notice served on them by KSPCB. The actual removal happened only after the intervention of Honourable High Court, hence the number of days of

violations shall be from the first notice to completion of removal, which is 1188 days. Violations prior to the notice served on 29-11-2016 are not considered as the exact period of violations are not available.

Table 7: Number of days of violation

<i>Year</i>	<i>Month</i>	<i>Days</i>
2016	November	1
2016	December	31
2017	January - December	365
2018	January - December	365
2019	January - December	365
2020	January	31
2020	February	29
2020	March	1
No. of days of violation		1188

Environmental compensation (EC) was assessed based on the CPCB guidelines using the following formula. The descriptors used in the formula and values considered for the descriptors are summarized in table: 8.

$$EC (Rs.) = PI \times N \times R \times S \times LF$$

Table 8: EC descriptors and values considered

<i>Components</i>	<i>Description</i>	<i>Value considered</i>
PI	Pollution Index of industrial sector	Red category (PI = 80)
N	Number of days of violation took place	1188 days
R	Rupee factor (100-500)	Industrial area (R factor 100)
S	Scale of operation (Small/ Medium/ Large)	Large (S = 1.5)
LF	Location factor	Industrial area (LF = 1)

The EC (Rs.) is worked out as = 80 x 1188 x 100 x 1.5 x 1 = 1,42,56,000.00

The estimated EC for a violation period of 1188 days is Rs. 1,42,56,000.00

7.0 Summary

The estimated financial liability on account of environmental damage/ cost of plastic pollution and environmental compensation are summarized in table: 9.

Table 9: EC descriptors and values considered

No.	Components	Damage/ EC	Remarks
1	Environmental damages/ cost of plastic pollution due to the remnant plastics in the soil/ site.	Rs. 72,85,468.96	This component may be utilized for the restoration/ containment of the site. In case the proponent is willing to contain/ secure the site with proper engineered measures, this component can be utilized for that purpose under the supervision of expert agencies and other stake holders.
2	The estimated Environmental Compensation (EC) for the total violation period of 1188 days.	Rs. 1,42,56,000.00	Environmental compensation for not taking action for the complete removal/ disposal of accumulated plastic waste in the site. Though KSPCB has issued notice in 2016, the industry has not taken any measure to comply with the notice. Only after the intervention of honorable High Court of Kerala, the removal of plastic waste was initiated.



Dr. Deepesh V
Scientist-C, CPCB



Jowin Joseph
Scientist, NEERI



Vinaya K S
Sr. Env. Engineer (SEE), KSPCB

ANNEXURE R1 a**Quantum of plastic waste removed and disposed to the common TSDF (M/s. KEIL,
Ambalamedu, Kochi)**

<i>S. No.</i>	<i>Month</i>	<i>Quantity of plastic wastes (MT)</i>
1	September 2018	265.035
2	November 2018	284.48
3	December 2018	252.58
4	January 2019	218.855
5	February 2019	333.965
6	March 2019	308.360
7	May 2019	377.810
8	July 2019	221.865
9	August 2019	113.810
10	September 2019	656.770
11	November 2019	1023.785
12	December 2019	131.995
13	January 2020	123.215
14	February 2020	2391.22
15	March 2020	9.505
Total		6713.250

केंद्रीय पेट्रोकेमिकल्स इंजीनियरिंग
एवं तकनीकी संस्थान (सिपेट)
(पूर्व में सेन्ट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी)
इंस्टिट्यूट ऑफ पेट्रोकेमिकल्स टेक्नोलॉजी (आई.पी.टी.)
रसायन एवं पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
एच. आई.एल. कॉलोनी, एडयार रोड, पातालम्
उद्योगमंडल पी.ओ. कोच्चि, केरल - 683 501
फोन : 0484-2547741, 2546740
ई-मेल: kochi@cipet.gov.in, cipetkochi@gmail.com
वेबसाइट : www.cipet.gov.in
मुख्यालय : गिण्डी, चेन्नाई - 600 032

ANNEXURE 5



**CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY (CIPET)**
(Formerly Central Institute of Plastics Engineering & Technology)
INSTITUTE OF PETROCHEMICALS TECHNOLOGY (IPT)
Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers, Govt. of India
HIL Colony, Edayar Road, Pathalam
Udyogamandal P.O., Kochi, Kerala-683 501
Ph: 0484-2547741, 2546740
E-mail:kochi@cipet.gov.in, cipetkochi@gmail.com
Web : www.cipet.gov.in
Head Office: Guindy, Chennai-600 032

ANNEXURE R1 b

सिपेट:आई पी टी-कोच्ची /परीक्षण/२०२१-२२

दिनांक : १९.०४.२०२१

CIPET: IPT-Kochi/Testing/2021-22/ 2018

Date : 19.04.2021

सेवा में / To

**The Senior Environmental Engineer,
Kerala State Pollution Control Board
Environmental Surveillance Centre
FACT-Qr No.S-5,Udyogamandal P.O.,Ernakulam-683501**

प्रिय महोदय / Dear Sir,

विषय : नमूनों की परीक्षण - संदर्भ में।

Sub.: Testing of samples – Reg.

Ref.:PCB/ESC/LAB-2/07 dt. 20.02.2021

हम इसके साथ परीक्षण के लिए प्रस्तुत नमूने से संबंधित टेस्ट रिपोर्ट क्रमांक 21013 दिनांकित 19.04.2021 संलग्न कर रहे हैं।

We are enclosing herewith Test Report No.21013 dt. 19.04.2021 pertaining to the samples submitted for testing.

कृपया संलग्न कस्टमर फीडबैक फॉर्म भरकर वापस भेजने का कष्ट करें।

Please find enclosed herewith the feedback form. Kindly fill and send it back to us.

धन्यवाद तथा सबसे अच्छी सेवा देने का आश्वासन के साथ,

Thanking you and assuring you our best services,

सादर, / Yours sincerely,

**प्रबंधक एवं प्रभारी, सिपेट : आई पी टी-कोच्ची
Manager & In-Charge, CIPET:IPT-Kochi**

संलग्न यथोक्त/ Encl. as above.

केन्द्र : अहमदाबाद, अमृतसर, औरंगाबाद, अगरतला, बद्दी, बालासोर, बेंगलूरु, भोपाल, भुवनेश्वर, चंद्रपुर, चेन्नाई, देहरादून, गुरुग्राम, गुवाहाटी, ग्वालियर, हैदराबाद, हाजीपुर, हल्द्विया, इम्फाल, जयपुर, कोच्चि, कोरबा, लखनऊ, मद्रुरै, मुरथल, मैसूरु, रायपूर, राँची, वलसाड, वाराणसी, एवं विजयवाडा

Centres : Ahmedabad, Amritsar, Aurangabad, Agartala, Baddi, Balasore, Bengaluru, Bhopal, Bhubaneswar, Chandrapur, Chennai, Dehradun, Gurugram, Guwahati, Gwalior, Hyderabad, Hajipur, Haldia, Imphal, Jaipur, Kochi, Korba, Lucknow, Madurai, Murthal, Mysuru, Raipur, Ranchi, Valsad, Varanasi & Vijayawada



परीक्षण रिपोर्ट
TEST REPORT

क्र.सं. / SI.No. **8015**

Test Report No :21013

Date :19.04.2021

Issued to :
**The Senior Environmental Engineer,
Kerala State Pollution Control Board
Environmental Surveillance Centre
FACT-Qr No.S-5,Udyogamandal P.O.,Ernakulam-683501**

Page 1 of 2

Ref No: Your letter PCB/ESC/LAB-2/07 dt. 20.02.2021

PART A : PARTICULARS OF SAMPLE SUBMITTED

Nature of Sample	: Soil samples as stated by party
Grade / Variety / type / Size / Class etc.	: Nil
Brand name, if any	: Nil
Declared values, if any	: Nil
Code No.	: 1)SR-1(coarse particles) 2)SR-1(fine Particles)
Batch No. and date of manufacture	: Nil
Quantity	: 1 Packet each
Mode of Packing	: Not Packed
Date of receipt of sample	: 20.02.2021
Date of commencement of test	: 25.03.2021
Date of completion of test	: 30.03.2021
Sealed or not	: Not Sealed
Any other information	: Nil

PART B: SUPPLEMENTARY INFORMATION

- a) Reference to sampling procedure : Supplied by the party
- b) Supporting documents for the measurements taken and results derived like graphs, tables, sketches and / or photographs as appropriate to test report, if any (to be attached) : Nil
- c) Deviation from the test methods as prescribed in relevant ISS / Work instructions, if any : Nil

S. Anup
Deputy

कमिकल्स इंजीनियरिंग
की संस्थान (सिपेट)

इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी
सूट ऑफ पेट्रोकेमिकल्स टेक्नोलॉजी (आई.पी.टी.)

रायन एवं पेट्रोसायन विभाग

रसायन एवं उर्वरक मंत्रालय, भारत सरकार
एच. आई.एल. कॉलोनी, एडयार रोड, पातालम्
उद्योगमंडल पी.ओ. कोच्चि, केरल - 683 501
फोन : 0484-2547741, 2546740

ई-मेल: kochi@cipet.gov.in, cipetkochi@gmail.com

वेबसाइट : www.cipet.gov.in



Continuation Sheet

**CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY (CIPET)**

(Formerly Central Institute of Plastics Engineering & Technology)

INSTITUTE OF PETROCHEMICALS TECHNOLOGY (IPT)

Department of Chemicals & Petrochemicals

Ministry of Chemicals & Fertilizers, Govt. of India

HIL Colony, Edayar Road, Pathalam

Udyogamandal P.O., Kochi, Kerala-683 501

Ph: 0484-2546740

E-mail:kochi@cipet.gov.in, cipetkochi@gmail.com

Web : www.cipet.gov.in

Test Report No :21013

Date :19.04.2021

Page 2 of 2

PART C : TEST RESULTS

Sl. No.	Test	Test Method	Unit	Results obtained
1	Identification of Plastic	ASTM D 3418 & ASTM E1252	--	Sample ID:SR-1 (coarse particles)
				Polyethylene (PE), Poly Propylene (PP) & Polyethylene terephthalate(PET)

Sl. No.	Test	Test Method	Unit	Results obtained
1	Identification of Plastic	ASTM D 3418 & ASTM E 1252	--	Sample ID:SR-1 (fine particles)
				Polyethylene terephthalate(PET)

PART D: REMARKS

- NB: i. This Test Report / Certificate is issued only for the samples submitted to CIPET.
ii. The results stated above related only to the items tested.
iii. The quality of the subsequent production lot has to be ensured by the purchaser
iv. This Test Certificate shall not be reproduced except in full without the written approval.
v. Details of test subcontracted – Nil.

S. Anujh.
Sr. Technical Officer

[Signature]
Manager (Technical)
Authorized Signatory

End of the Report

ANNEXURE-PHOTOGRAPHS



The site as on 19-02-2021



The site as on 06.07.2021



Sit inspection & sampling on 19-02-2021



Soil sampling carried out on 06-07-2021: plastic shreds in the soil



Soil sampling with augur



Remnant plastic in the soil



Plastic shreds/ debris on the site



Collected/ segregated plastic from site

NEERI's Perspective on Environmental Damage Assessment in the Existing Scenario:

As per the records of Kerala State Pollution Control Board (KSPCB), a closure direction was issued by KSPCB to the unit on 24-05-2016, following which a closure order was issued dated 17-06-2017, to which the unit had closed down. According to the data received, the alleged plastic waste dump site is situated within the premises of M/s. Sreesakthi Paper Mills Ltd. In order to remove the heaped plastic waste dumped in its premises, the KSPCB had served a notice to the unit on 29-11-2016 directing to remove the plastic waste by adopting one of the disposal means as follows,

- To transfer to cement plant for co-processing or
- To transfer to TSDF or
- To incinerate the same by obtaining proper consent

The above options were served with an instruction to dispose the plastic waste based on time bound manner and thereby to report to the board. Later, the Honorable High court of Kerala in its order dated 13-07-2018 had directed the unit to remove the waste and send it to M/s. KEIL (TSDF) under the supervision of KSPCB. Accordingly, further information depicts that the unit had transferred a total plastic waste of about 6713 tons to M/s. KEIL between September, 2018 to March, 2020. Now, with reference to the Honorable National Green Tribunal's order dated 20-01-2020 on OA No 262 of 2017(SZ), the three-member joint committee was formed and was entrusted with the following two tasks:

- To inspect the industrial clusters of Eloor, Edayar region regarding the efficiency of ETPs and CETPs in operation and also to observe the details of sewage discharge from the industrial clusters of Greater Kochi area which are discharging it into the river Periyar. Along with which the water quality of river Periyar and the status of implementation of ZLD facility by the industries in the region to be inspected and its efficacy assessment to be carried out to ensure all effluent that is generated gets recycled without discharging the same into river Periyar.
- Consideration of the question on damage to environment caused on account of the violation committed by M/s Sreesakthi Paper Mills Ltd for non-disposal of the plastic

waste generated by them and keeping it in their premises for a long period and to assess the environmental compensation as per the guidelines given by the Central Pollution Control Board in this regard.

In view of the honorable tribunal's order on the above two tasks, the first committee meeting was organized by KSPCB on 18-02-2020 and 19-02-2020, where the committee conducted a brief meeting followed by preliminary survey of few major industries in the industrial estate for details on its ETP operation and ZLD details. The committee members also visited the alleged plastic waste dump site of M/s Shree Sakthi Paper Mills Ltd. During this visit, it was observed the heaped plastic wastes were removed almost completely by the unit and sent to KEIL, however the joint committee opined to undertake soil sampling in the next visit to understand the depth of plastic contamination in the spot. The next visit was planned during March 2020, however this was postponed by the coordinating agency due to outbreak of COVID pandemic at Kerala. Meanwhile during Dec 2021, the OA-262 of 2017 committee undertook combined activities of site visit and sample collection along with the 396 of 2013 supervised joint committee which was also on assessing the pollution of Periyar river. However, later the 262 of 2017 committee was decoupled from the Periyar river pollution monitoring by the honourable tribunal in its subsequent order dated 19-01-2021 and the order was directed to focus on Sreesakthi Paper Mills Ltd issues only. Accordingly, the committee conducted visits on 19-02-2021 and 20-02-2021, during which the first set of soil sampling was conducted to understand the type of plastics leftover in the soil. The sampled plastics were submitted to CIPET for analysis.

The committee post the second wave of pandemic, had conducted its next field visit for further sampling on 06-07-2021, during which it was observed that the unit had converted its premises into warehouses and parking lots and the site where once plastic waste existed was completely removed till surface and covered by gravels and site preparation were executed for laying of concrete parking yard. KSPCB had stated to the fellow committee members that the parking lot activities were carried out by M/S Cella Space Ltd after obtaining due approval from the concerned authorities. Based on the observations made and since the soil sampling also showed left over quantity of plastics in the soil, the joint committee recommended for construction of compound wall and tree plantation in its premises for soil stability, to leave no chance of any plastic waste entering the river in future. The unit had undertaken a third party study from National Institute of Interdisciplinary Science and

Technology (NIIST), Trivandrum, which had also suggested in its report on capping of the site with impermeable cover on top and sides as a suitable option to prevent the transport of microplastics.

It is necessary to highlight the fact that plastic due to its high molecular mass is persistent in the environment and this nature of plastic enables it to stay in environment longer as it is for decades together and it literally takes centuries to disintegrate and decompose in landfill like conditions. Hence, considering the facts and further on the control measures of laying impervious concrete parking lots with compound wall and trees, may decelerate the microplastics formation and shall serve as a containment with almost no chances of any microplastics entering into the river in future.

However, in this scenario, what environmental damage the prolonged storage of plastic waste heap in the premises would have caused, is a matter of concern. After serving of notice by KSPCB to the unit in November 2016 followed by directions of hon'ble High Court, about 6713 tons of plastic waste heap were removed gradually and disposed to KEIL during the period of September 2018 to March 2020. Based on this periodical date, it may be attempted to assess if this stored plastic waste in the industrial premises for about 24-42 months had caused any damage to environment in terms of air, water, soil and/or ecosystem. **Only after this aspect of environmental damage is being quantified scientifically in terms of facts and data, the damage cost calculation part may be proceeded.**

It should also be acknowledged of the fact that there are no established national guidelines in existence to assess damages in similar to the current scenario with challenges of data unavailability. With reference to the "Report of the CPCB In-house Committee on Methodology for Assessing Environmental Compensation and Action Plan to Utilize the Fund" published by CPCB during mid-2019, projects the following cases to be considered for levying Environmental Compensation(EC):

- a) Discharges in violation of consent conditions, mainly prescribed standards /consent limits.
- b) Not complying with the directions issued, such as direction for closure due to non-installation of OCEMS, non-adherence to the action plans submitted etc.
- c) Intentional avoidance of data submission or data manipulation by tampering theOnline Continuous Emission / Effluent Monitoring systems.

- d) Accidental discharges lasting for short durations resulting into damage to the environment.
- e) Intentional discharges to the environment -- land, water and air resulting into acute injury or damage to the environment.
- f) Injection of treated/partially treated/ untreated effluents to ground water.

The report says that in the above instances as mentioned above in (a), (b) and (c), Pollution Index (PI) may be used as a basis to levy Environmental compensation with a formula of multiplying Pollution Index (PI) to the Number of days of violation took place (N), Factor in rupees for EC (R), Factor for Scale of Operation (S) and Location Factor (LF). However, this may not be applicable in this situation as the kind of violation does not fall in to either of the stated (a), (b) and or (c) cases.

The report also says in other instances i.e., (d), (e) and (f), the environmental compensation may contain two parts – one requires providing immediate relief and other long-term measures such as remediation. In these cases, detailed investigations are required from expert institutions/organizations based on which environmental compensation will be decided. However, the violation by the unit does not fall in to the category of (d), (e) and (f) as well. The CPCB committee that prepared the EC report had also made recommendations that under clause 1.5.1 that the Environmental Compensation may be levied only when CPCB has issued the directions under the Environmental (Protection) Act, 1986.

Further, it is also necessary to mention that referring publication journals also may not be attainable scientific solution in calculating damage cost as it varies on numerous factors and conditions.

Though the fact, that the plastic waste was stored in an unscientific manner in the industrial premises needs to be conceded, it also needs to be highlighted that no environmental damage in terms of pollution to air, water, soil or ecosystem beyond the industrial premises between November 2016 to March 2020 could be quantified based on the available data. This is based on the following pretexts that,

- The plastic waste stored in the industrial premises was not categorized as hazardous waste according to KSPCB.

- No detailed waste characterization report is available on the nature of waste that was stored.
- No third party technical studies or audits were conducted on scientific management or disposal of the plastic waste generated from the unit's processes.

For the overlooked/remaining undersoil plastic, considering the implementation of impervious concrete parking lot and compound wall structures along the bank of the river leaves no chance for assumption of microplastics entering into the river in future. Considering the non-availability of data and presented facts, the damage cost calculation could not be attempted in this condition here as it is deliberate that no environmental damage in terms of air, water, soil and or ecosystem could be assessed/quantified in a systematic and/or methodical manner.

Considering the above facts and limitations, an alternate and most attainable solution to recommend shall be levying of penalty rather than environmental compensation on the unit by the statutory bodies KSPCB/CPCB in terms of violation caused for unplanned and negligent waste management practices in its premises.

A handwritten signature in blue ink, reading "J. Jowin Joseph", with a horizontal line underneath.

Jowin Joseph
Scientist, NEERI