BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

PRINCIPAL BRANCH, NEW DELHI

OA No. 607/2024

In the matter of:

News Item titled ***"In Lucknow's waste-side story plastic peril paints grim picture"*** *appearing in the Hindustan Times dated 22.04.2024*

Index

Sr. No.	Particular's	Page No.
1.	**Reply** on behalf of Central Pollution Control Board, Respondent no. 2in compliance to Hon'ble NGT order dated 24.10.2024 in O.A No. 607/2024.	
2.	**Annexure-** I A copy of Assessment & Characterisation of Plastic Waste Generation in 60 Major Cities.	
3.	**Annexure-** II(A) A copy of signed declaration form by ULB for Swach Vayu Sarvekshan 2024.	
4.	**Annexure** -II(B) A copy of letter dated 25.06.2024 issued by UPPCB to Zonal Officer, UPPCB.	
5.	**Annexure-** III A copy ofImpact of Plastic Waste Disposal on Soil and Water QualityatLucknow Dumpsites.	
6.	**Annexure-** IV A copy of report dated 10.02.2023 filed by CPCB before Hon'ble NGT in OA No 251/2022.	
7.	**Annexure-** V A copy of letter dated 12.11.2024 issued by CPCP to all SPCBs/PCCs	
8.	**Annexure-** VI A copy of Gazette Notification of India dated 18.03.2016 G.S.R. 320(E)	
9.	**Annexure-** VII A copy of Hon'ble NGT order dated 27.05.2024 & 11.09.2024 in OA No 607/2024.	

Filed by Adv. Suman Arora
(On behalf on Central Pollution Control Board)

Place: Delhi
Dated: 03.12.2024

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

PRINCIPAL BRANCH, NEW DELHI

OA No. 607/2024

In the matter of:

News Item titled **"In Lucknow's waste—side story plastic peril paints grim picture"** appearing in the Hindustan Times dated 22.04.2024

REPLY ON BEHALF OF RESPONDENT NO. 2, THE CENTRAL POLLUTION CONTROL BOARD (CPCB)

1. That Hon'ble NGT vide Order dated 27.05.2024 impleaded the Central Pollution Control Board (hereinafter referred as CPCB) as Respondent no. 2. Thereby, the reply is made in succeeding paragraphs.

2. That, CPCB is a statutory Board constituted under Section 3 of The Water (Prevention and Control of Pollution) Act, 1974. It performs the functions under The Water (Prevention and Control of Pollution) Act, 1974, The Air (Prevention and Control of Pollution) Act, 1981 and The Environment (Protection) Act, 1986.

Background

3. Hon'ble NGT registered O.A No. 607/2024 Suo-motu on the basis of the News Item titled "*In Lucknow's waste—side story plastic peril paints grim picture*" appearing in the Hindustan Times dated 22.04.2024 which had highlighted the issue with respect to nearly 300 MT plastic waste generation in Lucknow, as mentioned in the said news item, to which the response by the answering respondent CPCB is given as follows:

3.1 Rising Plastic Waste: Lucknow generates nearly 300 metric tonnes of plastic waste daily, a significant increase from 59 tonnes in 2015. Of the total 1,500 metric tonnes of solid waste generated daily in Lucknow, 300 metric tonnes is plastic, making up 20% of the daily waste.

CPCB's response: As per Annual report provided by the Uttar Pradesh Pollution Control Board (UPPCB) for FY 2021-22, detailed waste generation in the year of FY 2015-16 and FY 2021-22 for Uttar Pradesh are given below:

FY	Solid waste(TPD)	Plastic waste	% plastic
2015-16	15192	1,30,777 TPA(358.29 TPD)	2.3
2021-22	14710	3,75,950 TPA(1030 TPD)	7.0

It is observed that there has been a slight decrease in the daily solid waste generation from 15,192 TPD in 2015-16 to 14,710 TPD in 2021-22. However, the amount of plastic waste generated increased significantly from 358.29 TPD in 2015-16 to 1030 TPD in 2021-22 which means it has increased substantially, from 2.3% in 2015-16 to 7% in 2021-22.

It is submitted that as per the Report on "Assessment & Characterisation of Plastic Waste Generation in 60 major cities" prepared by CPCB in *2015.*, 1200 TPD of solid waste was generated in Lucknow, out of which 59.03 Kg/T (5.9%) was plastic waste. The said report of the CPCB is annexed herewith as **ANNEXURE I.**

3.2 Soil Quality Degradation: A 2015 CPCB study found that soil samples from post- monsoon dumpsites were more alkaline compared to pre-monsoon samples, indicating increased alkalinity due to accumulated

plastic waste The high plastic content in dumped waste and the low infiltration capacity of hard soil lead to water logging, further degrading soil quality.

CPCB's response: It is submitted that as per CPCB study for "Impact of Plastic Waste Disposal on Soil and Water Quality at Lucknow Dumpsites" where Samples of soil and water were collected and analysed in both pre monsoon and post monsoon seasons. As per the analysis of Physio- chemical Parameters of Soil it was observed that the pH of dumpsite soil samples collected in the post-monsoon season was found to be more basic compared to pre-monsoon samples. This increase in alkalinity is due to the presence of carbonates and bicarbonates of calcium, magnesium, sodium, and potassium held by soil colloids. During the post-monsoon season, high rainfall at both sampling locations, combined with dumped waste containing high plastic content and hard soil profiles with low infiltration capacity, caused waterlogging at the dumpsite, leading to prolonged waterlogging, which increased soil alkalinity and raised pH levels to 7.0 and above until equilibrium with atmospheric carbon dioxide was reached. Study report is enclosed as **Annexure-III.**

3.3 Ineffectiveness of Plastic Ban: Despite a ban on single-use plastic in Lucknow, plastic waste remains a serious health hazard, exacerbated by modernization and consumerism disrupting environmental balance.

CPCB's response: As per information provided by SPCB/PCC status of enforcement of SUP ban in Uttar Pradesh (from July 2022- July 2023) is given below:

1	Total No of inspection conducted (since July 2022 - July 2023)	26717
2	Quantity of SUP item seized (since July 2022 - July 2023)	393.8 Tons
3	Fine imposed (since July 2022 - July 2023)	1.36 Cr

Further, as per details available on SUP Compliance Monitoring portal, status of SUP ban in Uttar Pradesh (after July 2023 to till now) is given below:

1	Total No of inspection conducted (July 2023 till November 2024)	154
2	Quantity of SUP item seized (July 2023 till November 2024)	0.076 tons
3	Fine imposed (July 2023 till November 2024)	93150

(NOTE: Lucknow- specific information is not available on the portal).

3.4 Environmental and Health Threats: Plastic waste poses threats to human health, reduces soil nutritional quality, and raises concerns about long-term environmental impact. Plastic does not biodegrade but breaks into micro-particles, posing serious threats to wildlife and human health. Studies link plastic pollution to health issues such as cancer, hormone disruption, and heart damage. Plastic waste has been detected in the blood of newborn babies, highlighting the widespread nature of plastic pollution in the environment.

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CPCB's Response: It is submitted that in compliance of Hon'ble NGT's order in O.A. No 251 of 2022, CPCB has filed report dated 13.02.2023. The report highlights widespread Micro plastics contamination across environment and organisms. Micro plastics enters water primarily through sewage, wastewater, and surface runoff, persisting due to inadequate filtration in treatment systems and contributions from plastic infrastructure. Micro plastic is also prevalent in bottled water. Airborne Micro plastic poses inhalation risks in urban settings, while soil contamination occurs via plastic films and waste. Micro plastic has been found in human biological samples, suggesting potential health impacts from ingestion and inhalation routes. However, presently there are no studies on the impacts of ingested micro plastics on human health. Submitted report is enclosed at **Annexure-IV.**

4. **ACTION TAKEN BY CPCB for Plastic Waste management---**

It is submitted by that CPCB has taken the following steps for Plastic Waste Management:

A. **Registration of Brand Owners/ Producers/Importers/Plastic waste processors**

Government of India, in its fourth Amendment to the Plastic Waste Management Rules, dated February 16, 2022, notified 'Guidelines on Extended Producer Responsibility for Plastic Packaging' in the Schedule II of the Rules.

As per these guidelines, Producers, Importers and Brand Owners (PIBOs) & Plastic Waste Processors (PWPs) shall have to register through the online centralized portal developed by the Central Pollution Control Board (CPCB). Total of 4722 Producers, 36994 Importers, 2896 Brand Owners & 2597 PWPs have been registered on the portal till date.

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B. **Promote alternative to Petro-based plastic carry bags/films i.e. the compostable carry bags:**

- As per the provisions 4(h) & 4 (ha) of PWM Rules, 2016 (as amended),

> *"the provision of thickness under clause (c) shall not apply to carry bags or commodities made from compostable plastic or biodegradable plastics. Carry bags and commodities made from compostable plastics shall conform to the Indian Standard: IS/ISO 17088:2021 titled as Specifications for Compostable Plastics.;*
>
> *(ha) the manufacture of carry bags and commodities covered under sub rule (3) shall be permitted to be made from compostable plastics or biodegradable plastics subject to mandatory marking and labelling laid down under these rules and the regulations of the Food Safety and Standards Authority of India for food contact applications. The manufacturers of compostable plastic or biodegradable plastic carry bags or commodities permitted under the rules, shall obtain a certificate from the Central Pollution Control Board before marketing or selling".*

- CPCB has framed the Standard Operating Procedure and developed the online portal for the certification of Compostable Manufacturers.

- As per provision 4(h) of PWM Rules, 2016, certificate has been issued to 325 Compostable Manufacturers till date by CPCB. The certified capacity has increased, from nil in 2016 to 3.65 lakh TPA.

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C. **Major directions issued for Strengthening Enforcement of PWM Rules:**

- **Directions under Section 5 of the EPA, 1986**: Issued to all SPCBs/PCCs on **12.11.2024** to conduct audit of registered PWPs in their jurisdiction. (**Annexure-V-A**).
- **Direction under section 5 of the Environment (Protection) Act, 1986:** Issued to all SPCBs/PCCs on **11.11.2024** to conduct inspection and monitoring of all compostable plastic manufacturing units in their jurisdiction. (**Annexure-V-B**)
- **Direction Under Section 5 of the Environment (Protection) Act, 1986**: Issued to the Principal Secretary, all State Urban Development Departments(UDDs) and SPCB/PCCs on the following dates: 01-02-2022, 30-06-2022, 01-03-2023, 17-05-2023, 20-11-2023, 16-02-2024 and 11.11.2024. These directions issued to conduct a joint enforcement drive for enforcement of SUP ban for four days a month. The latest direction, issued **on 11.11.2024**, for joint inspections from October 2024 to January 2025. (**Annexure-V-C**)
- **Direction Under Section 5 of the Environment (Protection) Act, 1986**: Issued to all SPCBs/PCCs on **04-07-2024** to direct local bodies and district panchayats to assess and characterize plastic waste for annual reporting as per Standard Operating Procedure(SOP) and PWM Rules. (**Annexure-V-D**).
- **Directions under Section 5 of the EPA, 1986**: Issued to all SPCBs/PCCs on **14-03-2024** to inform all PIBOs and PWPs to register on the centralized EPR portal by **31-03-24**. (**Annexure-V-E**)
- **Directions under Section 5 of the EPA, 1986**: Issued to all SPCBs/PCCs on **20-11-2023** to take immediate necessary actions for improved registration systems for EPR guidelines compliance. (**Annexure-V-F**)

- **Direction Under Section 5 of the Environment (Protection) Act, 1986**: Issued to the SPCB/PCC on **21-09-2023** to submit complete information for the Annual Report on PWM Rules for FY 2022-23. (**Annexure-V-G**)
- **Direction to Airlines operators regarding SUP**: Issued to 11 airline companies on **17-02-2023** to phase out banned SUP items. (**Annexure-V-H**)
- **Direction under Section 5 of the EPA, 1986**: Issued to 10 e-commerce companies and 21 e-commerce on **25-01-2023** and **13-12-2022** to stop usage of SUP items & ensure zero inventory. (**Annexure-V-I**)
- **Directions under Section 5 of the EPA, 1986**: Issued to plastic raw material manufacturers on **13-12-2022** regarding supply restrictions to unregistered producers and manufacturers of banned SUP items. (**Annexure-V-J**)
- Letter issued on 12.10.2022 to Chief Secretaries to issue necessary instructions to all concerned authorities in their jurisdiction to facilitate implementation of SUP Ban (Environment (Protection) Act,1986). (**Annexure-V-K**)
- Letter issued on 01.12.2021 to Custom Authorities to stop import of banned SUP items. (**Annexure-V-L**)

D. Environmental Compensation Regime: CPCB, in compliance of Hon'ble NGT order dated 10.9.20 in OA No. 247/2017 has framed Guidelines for assessment of Environmental Compensation (EC) for Violation of PWM Rules 2016. Guidelines have provisions for penal Action including seizure of goods and levying environmental Compensation for violation of Rule 4c & 4d of the PWM Rules, restricting thickness of carry bags/plastic sheet to 50 microns. The

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guidelines have been updated in March 2024 in accordance with amendments to PWM rules.

E. CPCB has developed guidelines for:

i. Management of Sanitary Waste.
ii. Disposal of non-recyclable fraction (Multi-layered) plastic waste.
iii. Collection, Segregation and Disposal of Plastic Waste.
iv. Co-processing of plastic waste in Cement Kilns.
v. Disposal of Thermoset Plastic Waste including Sheet Moulding Compound (SMC) and Fiber Reinforced plastic.
vi. Standard Operating Procedure for Assessment & Characterization of Plastic Waste.

F. CPCB has issued following publications on PWM:

i. Life Cycle Assessment (LCA) of Plastic Packaging Products
ii. Assessment & Characteristics pf Plastic Waste generated in 60 cities
iii. Plastic Waste Disposal through Plasma Pyrolysis Technique
iv. Impact of Plastic Waste Disposal on Soil & Water Quality at Lucknow dumpsites.

G. Activities of Single Use Plastic:

i. **Development of Web Portals:** CPCB developed two web portals for the management of banned Single Use Plastic, which are as under:

- **CPCB Monitoring Module for Compliance of SUP:** This portal allows Local Bodies to upload information about Sellers, Users, and Commercial Establishments and conduct inspections. Field officers can enter inspection data directly via a dedicated app. Registered entity details and inspection reports are accessible to Local Bodies,

State Pollution Control Boards (SPCBs), Pollution Control Committees (PCCs), and CPCB. It also enables SPCBs/PCCs to submit daily reports to CPCB. (http://plastic.cpcb.gov.in/sup).

- **SUP Public Grievance Portal:** This portal allows the public to register complaints regarding banned SUP items through an app. The portal has also mapped Local Bodies across India so that complaints submitted are directed to concerned Local Body (https://sup.cpcbccr.com/v2.0/#)

ii. **Workshops on Alternative to SUP**

- Fourteen state-level workshops on alternatives to SUP were conducted for MSMEs.
- CPCB held ten workshops for stakeholders and prepared a compendium of findings, available on CPCB's website.
- Compendium of presentations of workshops prepared and uploaded on CPCB's website.
- Compendium of manufacturers/sellers of alternatives to SUP prepared and uploaded on CPCB's website.

iii. **Enforcement Drive for implementation of SUP Ban**

CPCB issued directives for joint inspections to strengthen enforcement against SUP violations. Joint inspections were conducted from July 2022 to October 2024, resulting in 860,367 inspections, the seizure of 1,963.6 tons of SUP items, and fines totalling ₹19.78 crore throughout the country.

5. It is submitted that as per Rule 6 of PWM Rules, 2016(as amended) local body is responsible for development and setting up of infrastructure for segregation, collection, storage, transportation, processing and disposal of the plastic waste

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either on its own or by engaging agencies. Copy of Plastic Waste Management Rules is placed at **Annexure VI.**

6. That the answering respondent CPCB craves the leave of this Hon'ble Tribunal to file additional reply, in future, if required.

7. That, in the light of the above submissions, it is respectfully submitted that the answering respondent CPCB shall abide by any order(s) and/or direction(s) passed by the Hon'ble Tribunal in the instant case.

Divya

(Divya Sinha)
Scientist 'F'
Central Pollution Control Board

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BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

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OA No. 607/2024

In the matter of:

News Item titled **"In Lucknow's waste—side story plastic peril paints grim picture"** appearing in the Hindustan Times dated 22.04.2024

AFFIDAVIT

I **Divya Sinha**, working as Scientist 'F' in Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi, the Respondent No. 2, in the above matter, do hereby solemnly affirm, declare on oath and state as under: -

1. That I, the deponent herein is authorized representative to represent the Respondent CPCB in the present case, and as such, I am well conversant with the facts and circumstances of the present case on the basis of the information derived from the official records, and hence, I am competent and authorized to verify, sign and swear this affidavit on behalf of the Respondent CPCB.

2. That the accompanying reply may be read part and parcel of the present affidavit.

3. That the accompanying reply has been drafted and filed under my instructions and authority the contents thereof are true and correct on the basis of the record maintained during ordinary course of business of CPCB and the contents of the same are read over and explained to me and are not repeated herein for the sake of brevity.

DEPONENT

NOTARY PUBLIC
R.L. Chaudhary
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Regd. No. 1513
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दिव्या सिन्हा / Divya Sinha
वैज्ञानिक 'एफ' / Scientist 'F'
केंद्रीय प्रदूषण नियंत्रण बोर्ड
Central Pollution Control Board
(पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार)
(M/o Environment, Forest & Climate Change, Govt. of India)
परिवेश भवन, पूर्वी अर्जुन नगर, दिल्ली-110032
Parivesh Bhawan, East Arjun Nagar, Delhi-110032

VERIFICATION

Verified at Delhi on this 03 DEC 2024 day of _____ 2024 that the contents of the above reply are correct and true on the basis of the record of the cases as mentioned in the day to day affairs of the CPCB. Nothing has been concealed therefrom or mis-stated.

DEPONENT

दिव्या सिन्हा / Divya Sinha
वैज्ञानिक 'एफ' / Scientist 'F'
केंद्रीय प्रदूषण नियंत्रण बोर्ड
Central Pollution Control Board
(पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार)
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03 DEC 2024

Annexure- I

Assessment & Characterisation of Plastic Waste Generation in 60 Major Cities

CENTRAL POLLUTION CONTROL BOARD (CPCB)
Ministry of Environment, Forest & Climate Change

January, 2015

अरुण कुमार मेहता, भा.प्र.से.
अपर सचिव
(पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय)
ARUN KUMAR MEHTA, I.A.S.
Joint Secretary
(Ministry of Environment, Forest & Climate Change)
&
अध्यक्ष
केन्द्रीय प्रदूषण नियंत्रण बोर्ड
Chairman
CENTRAL POLLUTION CONTROL BOARD

भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
नई दिल्ली - 110003
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST &
CLIMATE CHANGE
NEW DELHI-110003

FOREWORD

The increasing use of plastics products, especially carry-bags and films and its littering and open burning emitting gaseous emissions has posed serious environmental problems. The synthetic and conventional (petro-based) plastics being non-biodegradable remains in the dump-yards/landfills for several years. For management of plastics waste (PW), source segregation is necessary to ensure that collected PW is used for beneficial purposes like road construction, co-processing, conversion of plastics waste into liquid fuel, etc. To quantify the plastics waste generation, a study was undertaken through Central Institute of Plastics Engineering and Technology (CIPET), Ahmedabad for **"Assessment and Quantification of Plastics Waste Generation in 60 Cities"** during 2010-12. The study has revealed that the total plastics waste generation is 3501 tons/day ranging from approximately 3% (Chandigarh) to 12% (Surat) in Municipal solid Waste (MSW).

This report is result of hard work put in by officials of CIPET, Ahmedabad and Dr. S.K. Nigam, Additional Director, CPCB. I hope that the report will be useful for Municipal Authorities/ Urban Local Bodies for formulating action plans for plastics waste management in cities/towns.

(A.K. Mehta)

'परिवेश भवन', सी.बी.डी. कम-ऑफिस कॉम्प्लेक्स, पूर्वी अर्जुन नगर, दिल्ली-110032
'PARIVESH BHAWAN', C.B.D.-CUM-OFFICE COMPLEX, EAST ARJUN NAGAR, DELHI-110 032
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CONTENTS

EXECUTIVE SUMMARY

Polymers or Plastics materials rapid growth in 1970s, 1980s and 1990s growing at the rate of 2.5 times the GDP growth in India. The demand for plastic raw material got more than doubled from 3.3 Million Metric Ton to 6.8 Million Metric Tons in 2010 attributed mainly to rapid urbanization; spread of retail chains, plastics based packaging from grocery to food & vegetable products to cosmetics & consumer items. Plastics packages have its merits but due to its non-biodegrability and improper collection system they become an eyesore alongwith Municipal Solid Waste (MSW) due to its high visibility.

As the synthetic & conventional plastics (petro-based) are non-biodegradable in nature, it remains in the dump-yards/ landfills for several years, if not collected propsly. In India, with dense population in cities & urban areas, despite of all efforts by Municipal Corporations/Local bodies, Source segregation of waste for separation of biodegradable/non-biodegradable/recyclable waste has not been effective so far & the fact is *plastics carry bags are used for packing & disposal of all kind of households, stained/soiled food or non food items & got mixed up with them. If plastics bags or packaging can be sorted or segregated from the source itself for beneficial purposes, the mixed contaminated & comingled waste would not land up at dump yards in cities.*

To assess and quantify the plastics waste generation and to reutilize the energy content of the polymer in an ecological and acceptable way, **a *Study was carried out on "Assessment and Quantification of Plastics Waste Generation in Major Cities" in collaboration with CIPET. The scope of the work comprises of assessment, quantification of plastics waste in dump sites of major 60 cities and suggesting the viable and appropriate recycling technologies (Based on "Zero" waste concept) with following Terms of References (ToR).***

1. TERMS OF REFERENCES (ToR) OF THE STUDY

- To assess the type, nature and quantum of plastics waste in the country through field survey and physical assessment at the ***MSW*** sites at 60 towns and Cities.
- Establish a Co-ordination mechanism with local Municipal/Metro corporations in identifying the dump grounds/ Localities of higher waste generation for the physical assessment/characterization of MSW as per the prescribed methodology.
- To report on the existing methodology for collection of waste by urban local bodies/Municipal bodies in different states of the country.
- To suggest the viable and appropriate recycling technologies at major cities with investment estimation for effective ***Plastics waste Management (based on " Zero Waste Concept")***
- Suggest Road Map/Recommendations for Plastics Waste Management as per the data available from the study for different towns and cities of the country.

2. OVERVIEW AND METHODOLOGY

The ASTM Method (D5231-92) method has been referred as guiding principle for assessment and quantification of plastics waste at Dump sites. Accordingly, this methodology was adopted to assess batch/samples of 1000Kg of fresh Municipal Solid waste (MSW) arriving at dumpsites on different days from different sources in vehicles like trucks/lorry. The 1000Kg of the sample is initially reduced to125 Kg by quartering technique, i.e.1000Kg are well mixed and divided into four sections where each section comprises approximately of 250 Kg, from this divided section the two opposite sections are discarded and the other two section are taken for the next quartering step. (steps illustrated in Fig 1A, 2B, 3C).

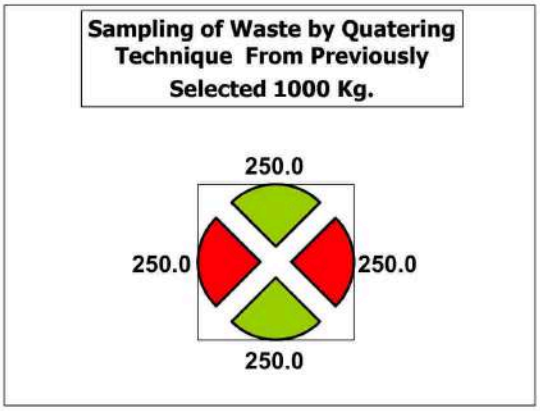


FIGURE1A: SAMPLING STEP: 1

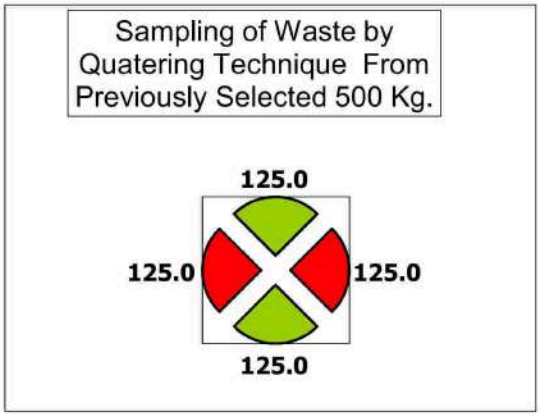


FIGURE 1B: SAMPLING STEP: 2

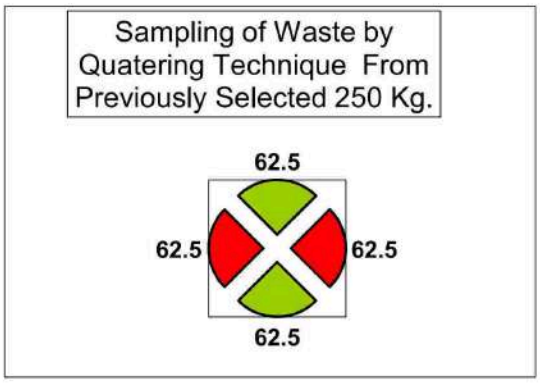
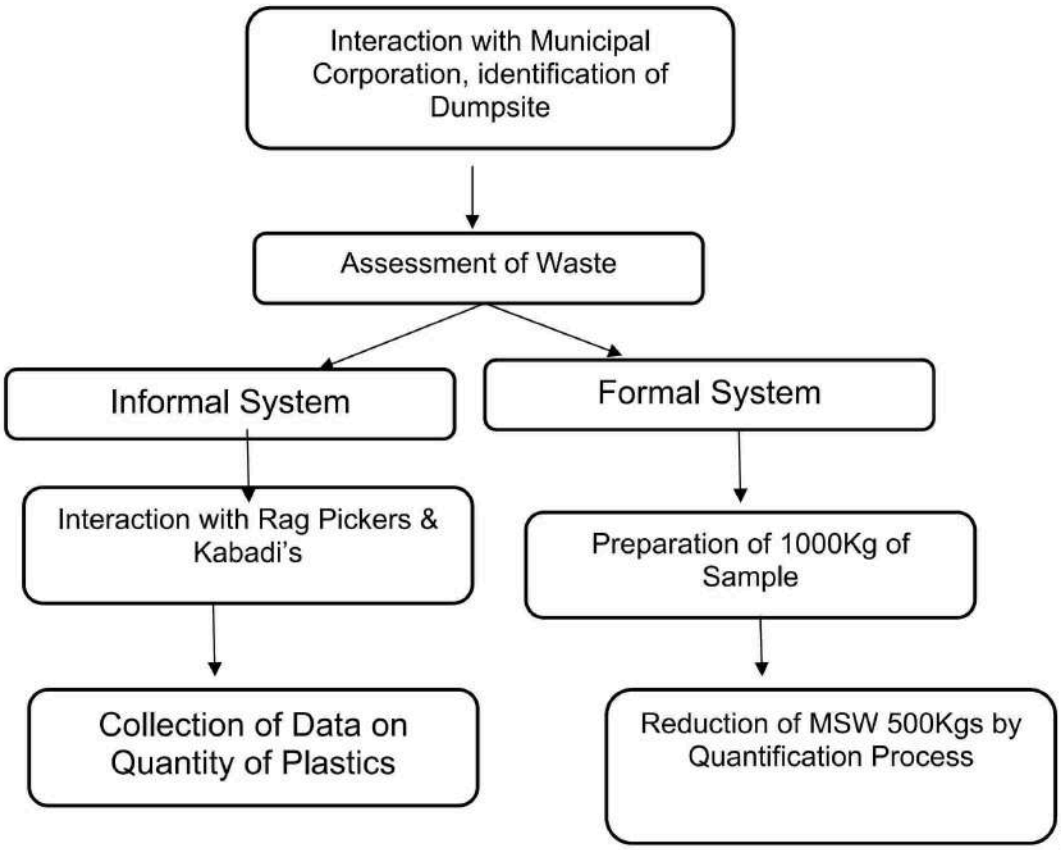


FIGURE 1B: SAMPLING STEP: 3

The plastics constitute two major categories: (i) Thermoplastics and (ii) Thermoset plastics. The plastics materials are categorized in seven types based on properties & applications. In order to make the recycling easier, the universally accepted standards has been developed to help consumers to identify and sort out the main types of plastics with marking code. The symbols defined by society of the plastic industry (SPI) USA are adopted as IS 14534:1998 of BIS are as follows:

PET HDPE PVC LDPE PP PS OTHER

From the sampled 125Kg of Municipal Solid Waste (MSW) the various types of plastics like PET, PE Based (LDPE/HDPE), PVC, PP, PS/ OTHER has been sorted out and segregated. Finally the segregated plastics are weighed and quantified as depicted in Figure 2.



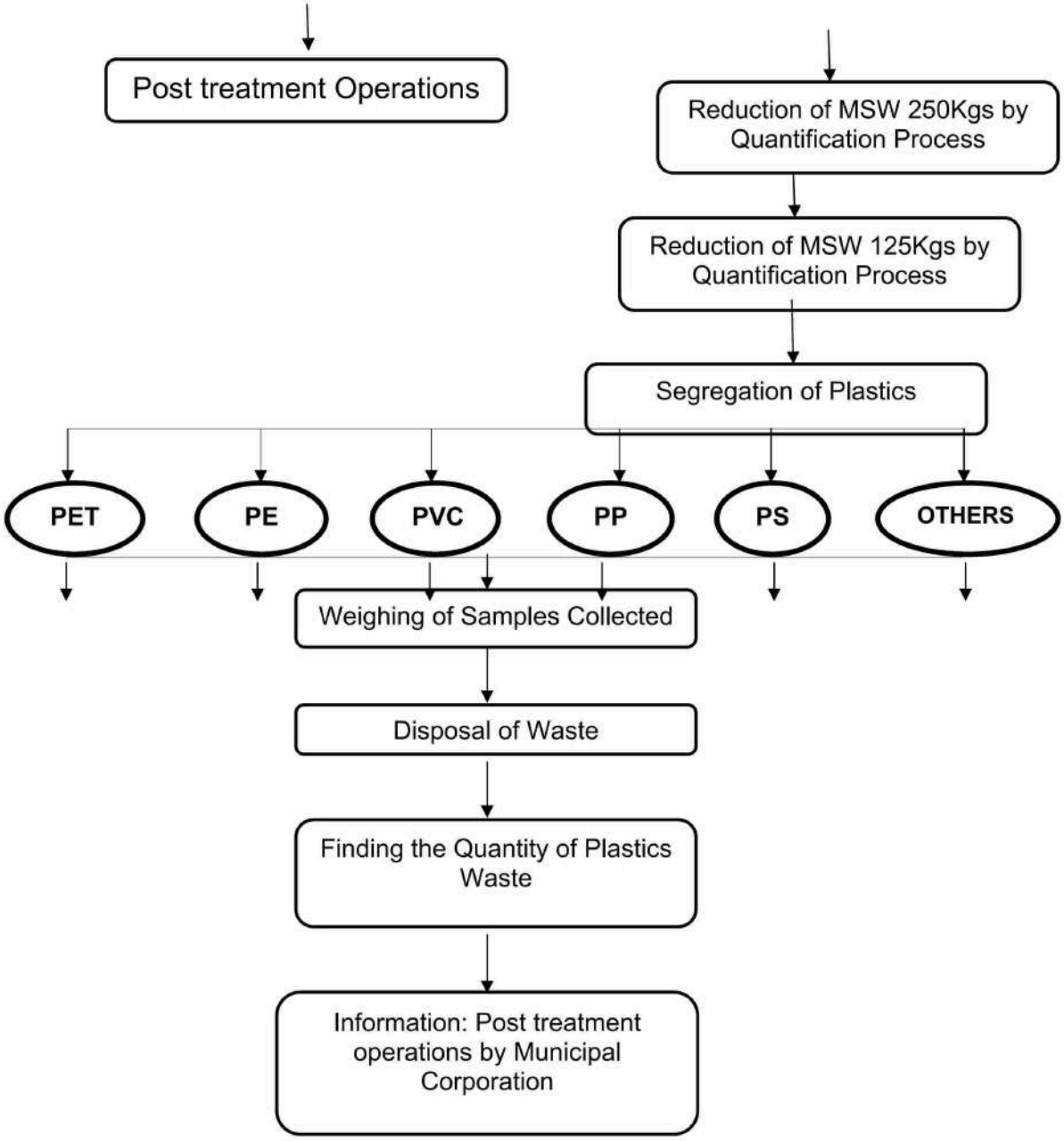


FIGURE 2: METHODOLOGY (PROCESS SEQUENCE) CHART

TABLE- A CLASSIFICATION OF PLASTICS WASTE

Sr. No	Source Code	Name of plastics	Few Applications
1.	 PET	Polyethylene Terephthalate (PET)	Drinking water Bottles, Soft drink Bottles, Food jars, Jelly pickles, Plastics Films, Sheets
2.	 HDPE LDPE	High Density Polyethylene (HDPE) Low Density Polyethylene (LDPE)	Plastics bags ,Food containers, woven sacks, Bottles, Plastics Toys, Milk Pouches & Shopping Bags, Metalized Pouches
3.	 PVC	Polyvinyl Chloride (PVC)	Pipes, Hoses, Sheets, Wire, cable insulations, Multilayer Tubes
4.	 PP	Polypropylene (PP)	Disposable Cups, Bottle caps, Straws,
5.	 PS	Polystyrene (PS)	Disposable Cups, glasses, Plates, spoons, trays, CD Covers, Cassette Boxes, Foams
6.	 OTHER	Thermoset, Poly Carbonate (PC), Poly urethane (PU) FRP	CD, Melamine Plates, Helmets, Shoe soles.

3. FIELD SURVEY (Field Survey Regions/ Locations)

For the assessment and quantification of plastics waste generation in India, the 60 Cities were selected in 05 regions, Northern, Southern, Eastern & Western, and Central regions.

4A. NORTHERN REGION comprises cities like ***Lucknow, Allahabad, Chandigarh, Delhi, Faridabad, Jammu, Srinagar, Shimla, Amritsar, Dehradun, Agra, Meerut, Varanasi, Kanpur, Patna, Ranchi, Jamshedpur, Dhanbad, Ludhiana.*** In almost all the cities the MSW generated from different sources like door to door, community bin at the street corners and from markets are collected by the municipal trucks or by the firms under contract to the government and dumped in the open dump yard. The findings of the survey are described city wise as given below.

TABLE: 01 STUDY OF LUCKNOW CITY: Plastics waste (PW) in Kg/ Metric Ton-(MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	9.182	19.428	4.7702	13.9304	6.314	4.306	57.9306
DAY 2	3.988	36.972	3.802	6.704	0.668	3.458	55.592
DAY 3	2.448	45.732	3.146	4.144	1.38	2.254	59.104
DAY 4	3.052	41.028	4.042	6.23	0.942	4.274	59.56
DAY 5	4.394	48.162	1.422	5.512	1.136	2.31	62.936
AVERAGE	**4.6128**	**38.264**	**3.4364**	**7.3041**	**2.0882**	**3.3204**	**59.03**

In Lucknow, Dodouli Dumping yard has been selected for the assessment. The assessment revealed that average total Plastic waste generation in Lucknow at the time of study was about 59.03Kg/MT as given in Table 1. It has been worked out from the above data that about 64% of total plastics waste is generated from PE family of (HDPE/LDPE) materials. The Total MSW generated (average) in Lucknow was 1200 MT/ Day. During the period of survey, the Minimum Plastics waste generation varies from 31.06 Kg/MT to 83.18 Kg/MT on different days of the week.

TABLE: 02 STUDY OF ALLAHABAD CITY:PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	3.508	40.402	4.472	8.908	1.726	4.062	63.078
DAY 2	6.036	4.018	1.84	17.436	0	18.702	48.032
DAY 3	7.152	8.6	1.064	6.212	1.288	23.908	48.224
DAY 4	5.372	33.398	6.788	7.78	0.498	2.392	56.228
AVERAGE	**5.517**	**21.605**	**3.541**	**10.084**	**0.878**	**12.266**	**53.89**

In Allahabad, Badshi Bandh and Karamati chowki dumping grounds have been selected for the study. The data given in table 2 indicates that average Plastics-waste generation in Allahabad was about **53.89Kg/MT** out of total MSW waste of about 350 MT/day. Around 40% of total plastics waste is generated from HDPE & LDPE materials. The minimum & maximum Plastics waste generation at Allahabad have been assessed as 16.72 Kg/MT and 102.46Kg/MT respectively. The burning of MSW and plastic waste use found at the dumping ground. *No mechanism of dumping or any other post-treatment operation was found.*

TABLE: 03 STUDY OF CHANDIGARH CITY:PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	0.24	17.6	0.8	6.4	1.6	4.8	31.44
DAY 2	0.8	15.2	5.6	0.32	0.8	9.6	32.32
DAY 3	0	19.2	0.4	5.6	2.4	13.6	41.2
DAY 4	0	16.8	0.2	7.2	2	12	38.2

DAY 5	0	11.2	4	4	1.6	4	24.8
DAY 6	0	8	0	4	1.6	0	13.6
DAY 7	0	12.8	0.16	3.2	1.6	7.2	24.96
DAY 8	0.32	17.6	0	9.6	3.2	4	34.72
DAY 9	0.16	21.6	0.2	8.8	1.6	4.8	37.16
DAY 10	0.16	16	0.08	9.6	0.8	4.8	31.44
AVERAGE	**0.168**	**15.6**	**1.144**	**5.872**	**1.72**	**6.58**	**30.98**

In Chandigarh, the collection & segregation of MSW is being done by rag pickers before dumping in the open dump yard. The city corporation in association with CAW &ED society has built Sehay Saji Kaneehas to collect maximum plastic waste generated at various resident areas from different parts of the city. In addition to this, M/s Jaiprakash Associated ltd has setup a Green Tech Fuel processing plant which has capacity of 500 MT/ Day to produce a product of RDF (Refuse Derived Fuel).

Daddu Nagar site has been selected for the study. The average total Plastic waste generation in Chandigarh was found to be about 30.98Kg/MT reported in Table 3. Around 52% of total plastics wastes are generated from HDPE/LDPE materials and 23% of unclassified/other plastics waste. The Total MSW generated in this city was with an average of 264 MT/ Day. It has been reported that plastic waste generation varies from 13.60 Kg/MT to 41.60Kg/MT on different Weekdays.

TABLE: 04 STUDY OF DELHI CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	2.6026	85.245	1.205	8.381	6.757	2.946	107.138
DAY 2	5.981	79.786	1.045	3.869	7.56	1.008	99.256
DAY 3	1.94	79.56	0.852	6.72	6.42	1.192	96.684
DAY 4	3.522	75.024	1.304	2.925	9.210	3.293	95.28
DAY 5	1.416	67.349	2.632	9.33	17.221	9.298	107.253
AVERAGE	**3.175**	**77.24**	**1.447**	**6.213**	**9.650**	**3.716**	**101.44**

In Delhi, the quantity of plastic waste has been assessed as 10.14%, which comprises of 76% of HDPE/LDPE, 7% of PVC and 10% of Polystyrene material, described in Table 4. The Total MSW generated in this city was with an average of 6800 MT/ Day. During the survey on different weekdays, the minimum plastic waste generation was 87.23 Kg/MT and maximum was 118.74Kg/MT. The field survey was carried out at Gazipur, East Delhi. It has been observed no post-treatment operation for MSW is carried out in the city and 100% of MSW is dumped as land-filling. Approximately, 200-250 rag pickers were voluntarily collecting the valuable plastics waste that was generated throughout the day. Further the compost fertilizer plant having the capacity of about 500MT was established in the city, but currently the plant produces with an output of about only 200 MT. Delhi, being the capital city requires urgent attention for efforts to recycle the recyclable plastic waste such as PET, PE & PP & PVC etc. since the quantum of waste would increase further in future. With over 10% of Plastics Waste in MSW, waste management authorities/civic bodies should set-up Plastics Waste Management Cell (PWMC) exclusively to deal with plastics waste by adopting prevailing technologies.

TABLE: 05 STUDY OF FARIDABAD CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	8.736	104.054	0.32	2.36	4.3	1	120.77
DAY 2	15.368	74.4	1.648	1.144	6.984	0	99.544
DAY 3	14.444	87.65	1.656	7.79	6.996	0	118.54
AVERAGE	**12.849**	**88.701**	**1.208**	**3.765**	**6.093**	**0.333**	**112.95**

In Faridabad, the survey was conducted at Bandhwari Village, Gudam Road which has the average total MSW was around 700 MT/Day out of the average PW was generated about 112.95 Kg/MT. The classified data for different types of plastics waste is represented in Table 5. The study data revealed that about 80% of plastics waste was from HDPE/LDPE material, which is recyclable. The waste management in Faridabad is carried by M/s. A.K.Enterprise (Hanjar Bio-Tech), they have deployed rag pickers of about 150-200Nos.are employed in this treatment plant. The MSW generated in Faridabad and Gurgaon are treated in this plant. Apart from this the following post treatment plant are also currently present at Faridabad city :-

- Compost plant for fertilizer of capacity 600MT/day.
- RDF, Bricks plant of capacity 300 MT/Day
- Plastics recycling unit

TABLE: 06 STUDY OF JAMMU CITY: PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	1.52	29.2	14.16	19.2	4.48	9.44	78
DAY 2	3.2	21.6	1.76	23.52	7.92	34.08	92.08
DAY 3	2.56	36.88	0.64	28.00	5.92	9.76	83.76
DAY 4	0.32	16.48	0.64	12.16	8.16	9.12	46.88
DAY 5	0.96	35.68	1.76	12.32	4.8	12.64	68.16
DAY 6	1.12	41.28	3.04	27.68	4.16	8.8	86.08
DAY 7	2.56	16.32	0.96	20.32	3.52	7.2	50.88
AVERAGE	**1.7486**	**28.206**	**3.21**	**20.457**	**5.56**	**13.006**	**72.26**

The data of Bhagwati Nagar dumping ground at Jammu generate an average PW of about 72.26Kg/MT as shown in Table 6. Out of which, 66% comprise HDPE/LDPE/PP materials with a minimum plastics waste generation 46.88 Kg/MT and with maximum of 92.08Kg/MT. The Total MSW generated in this city was with an average of 300 MT/ Day. Although, the Jammu and Kashmir Government has ban on the usage of the carry bags, but still it is observed that huge quantity of plastics packaging materials are littered. Since proper dumping yard is not available, the dumping of plastic carry bag has also ban observed in Tawi River.

TABLE: 07 STUDY OF SRINAGAR CITY : PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	3.2	16.68	5.68	13.6	6.48	2.36	48
DAY 2	10.4	23.3	9.6	15.2	2.32	9.04	69.86
DAY 3	2.52	21.16	4.52	10.56	5.76	1.976	46.496
DAY 4	3.24	21.68	4.208	9.112	6.64	2.48	47.36
DAY 5	2.32	25.056	3.592	7.144	4.032	6.52	48.664
DAY 6	2.56	24.88	4.096	9.6	3.976	1.52	46.632
AVERAGE	**4.04**	**22.126**	**5.2827**	**10.869**	**4.868**	**3.9827**	**51.17**

In Srinagar, survey has been conduced at Achan Saidpura dump site. The study data shows total MSW is about 550 MT/Day of which, the total average PW is about 51.17Kg/MT. In which the types of plastics are classified and showed as 42% of HPDE/LDPE and 21% of PP waste material represented in Table 07. During the survey the minimum plastic waste generation is in 4.7 Kg/MT and maximum is 7.0 Kg/MT.

TABLE: 08 STUDY OF SIMLA CITY: PW(Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	1.68	17.28	0.64	19.44	1.6	4.72	45.36
DAY 2	3.6	22.6	0.56	17.48	1.16	13.44	58.84
DAY 3	2.68	15.4	0.76	12.6	2.16	5.56	39.16
DAY 4	2.676	17.8	1.16	12.4	1	4.76	39.796
DAY 5	2.32	15.44	0.8	11.72	2.24	5	37.52
DAY 6	1.56	13.64	1.32	8.04	3.36	4.2	32.12
DAY 7	3.68	26.64	0.56	20.24	2.16	5.44	58.72
AVERAGE	**2.599**	**18.400**	**0.829**	**14.56**	**1.954**	**6.160**	**44.502**

In Simla, it is observed that separate system (incineration) is used for medical waste. Two types of dust bins are provided at Simla, to collect the Bio-degradable and Non-Biodegradable municipal solid waste (MSW). Survey has been conduced at Darini ka bagicha dump site. The total MSW is about 50 MT/Day out of which the total average PW is about 44.502 Kg/MT. In which the types of plastics are classified and showed the majority of 39.3% of HPDE/LDPE and 32.3% of PP waste Material as indicated in Table 08. During the survey the minimum plastic waste generation is in the range from 32.12 to 58.84 Kg/MT on few weekdays.

TABLE: 09 STUDY OF AMRITSAR CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	0	13.92	0.8	15.52	3.2	1.44	34.88
DAY 2	2.24	28.32	1.76	13.28	5.6	15.52	66.72
DAY 3	1.28	20	1.76	9.92	1.92	0	34.88
DAY 4	0	26.24	0	20.8	2.4	3.04	52.48
DAY 5	1.6	18.56	0.8	12.8	1.44	5.44	40.64
DAY 6	3.04	21.12	2.24	23.2	2.4	3.36	55.36
DAY 7	0.64	15.04	0	11.52	2.56	1.76	31.52
DAY 8	1.44	18.72	1.12	14.24	2.24	0.96	38.72
AVERAGE	**1.28**	**20.24**	**1.06**	**15.16**	**2.72**	**3.94**	**44.40**

In Amristar, the plastics assessment and quantification study was conducted at Bhagtawala dumping site. The findings on table 9 revealed that the total MSW generation was about 550 MT/Day. The average PW was observed as 44.40Kg/MT, the majority of plastics waste found as carry bags and packaging pouches which is of 45.5% belong to the classification of HDPE/LDPE material. The field study revealed that the minimum plastic waste generation is 31.52Kg/MT and maximum of 66.72Kg/MT

TABLE: 10 STUDY OF DEHRADUN CITY: PW(Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	8.484	43.154	6.912	9.61	1.86	2.178	72.198
DAY 2	9.14	36.212	2.574	4.554	2.406	5.33	60.216
DAY 3	10.358	43.374	4.616	6.2	1.56	3.318	69.42
DAY 4	5.102	38.974	7.412	6.14	4.34	2.31	64.278
AVERAGE	**8.271**	**40.429**	**5.3785**	**6.626**	**2.5415**	**3.2839**	**66.53**

The field study for assessing and quantifying the plastics waste has been carried out at Sahastradhara dumping ground. The total MSW of Dehradun was about 220 MT/Day, out of which, the PW generation is 66.53Kg/MT, the majority of plastics waste was observed as carry bags, packaging pouches and multilayer films of about 61 % made up of HDPE/LDPE material. The findings of Dehradun are reported in Table 10.

TABLE: 11 STUDY OF AGRA CITY: PW(Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	10.33	42.724	5.972	8.484	1.122	11.014	79.646
DAY 2	8.786	42.688	7.624	6.746	1.24	7.672	74.756
DAY 3	8.746	45.064	8.226	10.162	0.18	9.82	82.198
AVERAGE	**9.2873**	**43.492**	**7.274**	**8.464**	**0.8473**	**9.502**	**78.87**

In Agra, the field survey was carried out at chhalesar dumping site, where the dumping of average total MSW of about 520MT/Day.The data revealed that

about 78.87 Kg/MT of PW was generated as represented in table 11. However, 55 % plastics waste is generated from HDPE/LDPE materials consist of carry bags, household items and multilayer films. The minimum plastics waste generation is about 58.6 Kg/MT and Maximum of about 95.15 Kg/ MT.

TABLE: 12 STUDY OF MEERUT CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	6.49	41.106	6.924	7.114	0.658	3.588	65.88
DAY 2	6.152	42.46	6.0205	4.776	1.582	7.2485	68.24
DAY 3	4.88	42.244	3.022	5.328	0.626	6.614	62.714
DAY 4	1.552	41.218	4.612	6.758	2.484	3.402	60.026
AVERAGE	**23.26**	**23.451**	**5.569**	**3.6658**	**3.2753**	**34.715**	**64.22**

In Meerut, Lohia nagar Hapur Road, Mangat puram, Delhi Road dumping site were selected for the plastics quantification field survey. The field study provided the data, which represented an average PW of about 64.22 Kg/MT, where the total MSW generated in the city is of about 52 MT/Day. The data for segregated plastics waste is given in Table 12. The majority of plastics waste generated from HDPE/LDPE and PET has 36.5% and 36.2% respectively. Further, data revealed that the minimum quantity of plastics waste generation is about 51.37 Kg/ MT and a maximum of about 81.81 Kg/MT.

TABLE: 13 STUDY OF VARANASI CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	4.48325	28.066	15.27	6.268	0.64	4.176	58.90
DAY 2	5.712	42.898	4.108	7.384	1.434	4.135	65.670
DAY 3	4.208	37.406	4.354	3.988	1.78	3.562	55.298
DAY 4	2.844	40.164	2.586	5.936	0.54	3.53	55.6
DAY 5	12.3775	13.038	4.588	10.058	2.216	10.2	52.47
AVERAGE	**5.925**	**32.314**	**6.1812**	**6.7268**	**1.322**	**5.1205**	**57.59**

The quantity of plastics waste generated through Sheer Govardhan and Tenura Mau Dam at Varanasi are 57.59 Kg/MT. The total MSW generated at Varanasi was about 450 MT/Day. However, it has been observed that major part of value added plastics generated on HDPE/LDPE materials like carry bags, multilayer plastics etc which is about 56% given in table 13. The minimum plastics waste generated of about 23.68 Kg/MT and Maximum of about 94.44 Kg/ MT

TABLE: 14 STUDY OF KANPUR CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	4.3802	53.15	3.5102	7.0022	0.9582	2.9682	71.969
DAY 2	4.236	40.196	8.17	2.08	0.38	1.24	56.302
DAY 3	3.366	48.708	7.98	7.02	0.44	1.03	68.544
DAY 4	8.36	45.68	4.262	8.54	0.34	3.442	70.624
AVERAGE	**5.0856**	**46.934**	**5.9806**	**6.1606**	**0.5296**	**2.1701**	**66.86**

The field study at Kanpur city was conducted at Panci Bhausing dumping ground. The total MSW generated at Kanpur was about 1600 MT/Day. The average total PW generated was about 66.86 Kg/MT given in table 14, during the field survey it is observed that the majority of plastic waste generated on HDPE/LDPE materials like carry bags, bottles, and multilayer plastics. The minimum plastics waste generated of about 51.78 Kg/MT and maximum of about 94.08 Kg/ MT

TABLE: 15 STUDY OF PATNA CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	1.052	27.312	6.934	1.702	4.494	3.660	45.154
DAY 2	1.322	34.8595	0.68	8.616	1.686	3.986	51.150
DAY 3	1.426	33.25	0.596	11.458	3.042	2.126	51.898
DAY 4	1.27	35.4065	0.6135	6.084	4.216	6.016	53.606
DAY 5	1.932	38.124	1.07	4.762	3.772	10.7615	60.4215
DAY 6	1.558	45.831	0.608	9.636	6.866	6.928	71.427
DAY 7	1.672	46.564	0.42	8.988	5.008	4.444	67.096
AVERAGE	**1.4617**	**37.335**	**1.5602**	**7.3209**	**4.1549**	**5.4173**	**57.250**

In Patna, the plastics assessment and quantification study was conducted at Bairia. The findings revealed that the total MSW was about 220 MT/Day. The PW was observed as 57.25 Kg/MT, out of which the majority of plastics waste found as carry bags and packaging pouches which is of 65.15% made up of HDPE/LDPE material. The field study reveals that the minimum plastic waste generation 35.98 Kg/MT and maximum of 76.57Kg/MT. The data observed during field study are resulted in table 15.

TABLE: 16 STUDY OF RANCHI CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	0.994	35.648	0.36	7.002	3.732	9.31	57.046
DAY 2	0.702	37.4105	0.896	6.472	3.844	6.986	56.3105
DAY 3	1.024	37.95	0.438	6.28	4.842	8.266	58.8
DAY 4	0.716	40.404	1.194	6.472	5.244	6.02	60.05
DAY 5	0.68	42.546	0.436	6.542	5.89	5.358	61.452
DAY 6	0.686	43.28	0.84	5.71	3.368	6.186	60.07
DAY 7	0.656	42.088	0.89	6.46	4.332	6.226	60.652
AVERAGE	**0.7797**	**39.904**	**0.722**	**6.4197**	**4.4646**	**6.9074**	**59.20**

The quantity of plastics waste generated through Jhiri Dump site at Ranchi are 59.20 Kg/MT. The total MSW generated at Varanasi is above 140 MT/Day. Majority of the plastics waste was observed on HDPE/LDPE material which is about 67.3% given in table 16. The minimum plastics waste generation is about 48.75 Kg/MT and maximum of about 67.59 Kg/ MT.

TABLE: 17 STUDY OF JAMSHEDPUR CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	2.3725	13.95	0.65	3.688	3.806	4.554	29.020
DAY 2	1.584	18.432	0.226	2	2.476	3.87	28.59
DAY 3	1.941	19.874	0.521	2.728	2.217	3.28	30.561
DAY 4	3.070	31.943	0.487	3.890	3.933	2.693	46.017
AVERAGE	**2.242**	**21.05**	**0.471**	**3.077**	**3.108**	**3.599**	**33.55**

In Jamshedpur, the field survey was carried out at Bhuiandhri Dump site and the average PW generated about 33.55 Kg/MT. The total MSW generation at Jamshedpur is about 28 MT/Day. The actual quantity of plastic waste worked out from the survey is given in table 17. The data revealed that 6.68% of PET, 62.11% of HDPE/LDPE, 1.436 % of PVC, 9.23 % of PP, 9.23% of PS and finally 11.18% of unclassified plastics are produced. The minimum plastics waste generation was about 26.34 Kg/MT and maximum of about 50.78 Kg/ MT.

TABLE: 18 STUDY OF DHANBAD CITY: PW(Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	1.068	33.64	0.76	6.366	3.232	5.726	50.792
DAY 2	0.9445	35.665	0.51	6.032	3.168	6.88	53.1995
DAY 3	0.65	36.604	0.45	4.72	2.722	4.856	50.002
DAY 4	0.606	36.15	0.367	6.847	2.974	5.004	51.948
DAY 5	0.552	35.058	0.756	4.286	3.336	6.09	50.078
DAY 6	0.518	29.42	0.47	4.826	3.286	3.9291	42.449
DAY 7	0.574	35.65	0.28	5.808	4.37	5.944	52.626
AVERAGE	**0.7018**	**34.598**	**0.5133**	**5.555**	**3.2983**	**5.4899**	**50.16**

In Dhanbad, Telipada & Matkudiya dumping yard has been selected as the study area for this project. The study revealed that average total plastic waste generation in dhanbad was about 50.16Kg/MT represented in Table 18. It has been worked out from the survey data about 69% of total plastics waste generation from HDPE/LDPE materials. The Total MSW generated in this city was with an average of 150 MT/ Day. During the survey the minimum plastic waste generation 35.98 Kg/MT and maximum of 55.75 Kg/MT.

TABLE: 19 STUDY OF LUDHIANA CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY	0.56	34.96	1.36	9.52	1.12	3.76	51.28
DAY 2	0.16	45.68	1.36	10.16	0.24	5.6	63.2
DAY 3	1.04	60.4	0.52	17.52	1.6	4.4	85.48
DAY 4	1.2	43.12	1.28	9.44	1.92	4.48	61.44
DAY 5	0.32	32.56	4.48	9.12	0.32	7.12	53.92
DAY 6	0.00	28.72	0.56	9.76	0.72	2.64	42.4
AVERAGE	**0.547**	**40.91**	**1.593**	**10.92**	**0.987**	**4.667**	**59.62**

Total MSW that is generated in Ludhiana city was about 850 MT/Day, The data revealed that average plastics waste generation was about 59.62Kg/MT. The study indicate that 40.91Kg/MT (68.6%) plastics waste obtained from HDPE/LDPE material, the data reported in table 19. Further, it is observed that the minimum plastics waste of about 42.40 Kg/MT and a maximum of 85.48 Kg/MT.

The average total municipal solid waste generated is compared with the percentage of average plastics municipal solid waste obtained in each city is shown in Chart 1.

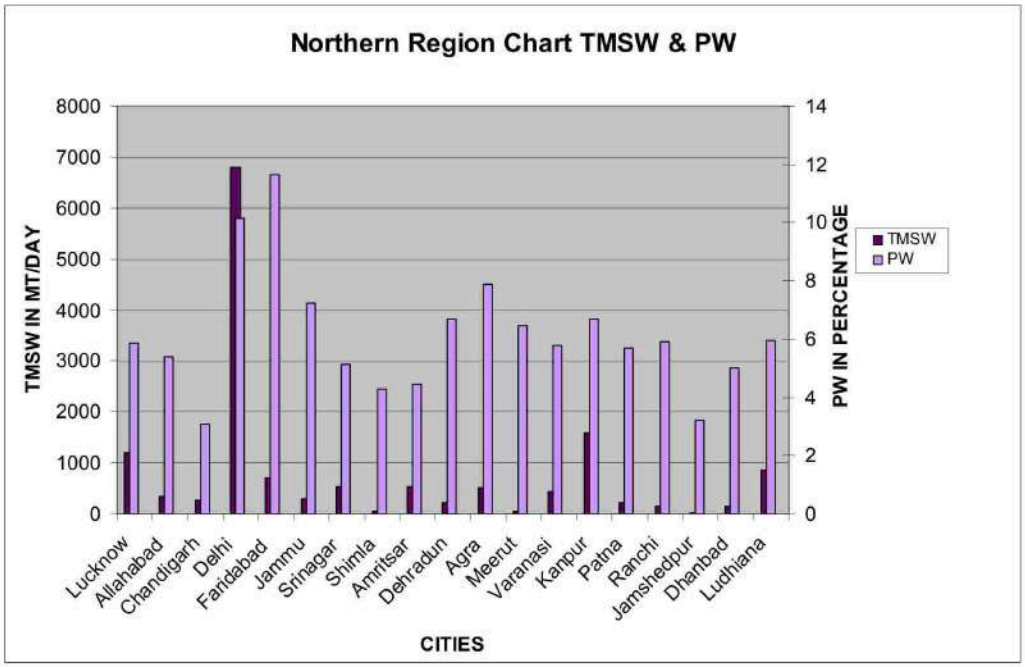


CHART 1: NORTHERN REGION
TMSW GENERATION Vs PW GENERATION

4B. SOUTHERN REGION: comprises of ***Chennai, Bangalore, Coimbatore, Kochi, Madurai, Port Blair, Thiruvananthapuram, Puducherry, Kavarati, Hyderabad, Vijayawada, Vishakhapatnam.***

TABLE: 20 STUDY OF CHENNAI CITY: PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	9.06	89.94	1.25	3.67	2.32	0.56	106.8
DAY 2	2.74	82.19	4.16	7.87	1.34	0.52	98.82
DAY 3	2.34	62.64	3.18	7.97	2.66	0.68	79.47
DAY 4	1.49	85.73	1.89	3.2	3.36	0.92	96.59
AVERAGE	**3.9075**	**80.125**	**2.62**	**5.6775**	**2.42**	**0.67**	**95.42**

In Chennai the assessment and quantification of plastics waste was conducted at Perungudi and Kodungaiyur dump sites having the total MSW of about 4500MT/Day, and the plastics were assessed as with an average of 95.42 Kg/MT. The collected MSW is directly dumped without any post treatment operation. The survey data is represented in table 20, which reveals around 84% of HDPE/LDPE waste comprising of carry bags, milk pouches and packing films. The data obtained with a minimum of 79.47Kg/MT and a maximum of 106.80Kg/MT.

TABLE: 21 STUDY OF BENGALURU CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	2.1	90.8	1	0.64	0.88	1.7	97.12
DAY 2	0.94	67.8	0.74	0.9	0.64	1.52	72.54
AVERAGE	**1.52**	**79.3**	**0.87**	**0.77**	**0.76**	**1.61**	**84.83**

Total MSW that are generated in Bangalore city was about 3700 MT/Day. The survey was conducted at Mavallipura Dumpsite which has the average PW generation of 84.83Kg/MT Shown in Table 21. Around 93% of total plastics waste generated from HDPE/LDPE/LLDPE materials with the minimum plastic waste generation of 72.54 Kg/MT and Maximum of 97.12 Kg/MT.

TABLE: 22 STUDY OF COIMBATORE CITY: PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	2.78	71.09	1.66	4.6	3.42	0.26	83.81
DAY 2	4.32	88.85	1.75	5.26	4.69	0.77	105.64
AVERAGE	**3.55**	**79.97**	**1.705**	**4.93**	**4.055**	**0.515**	**94.73**

The study has been conducted in vellalur dumpsite at Coimbatore city. The segregated plastics are given in Table 22. The total MSW in the city was about 700 MT/ Day with an average PW of 94.73 Kg/MT. The PW was obtained with a minimum of 83.18 Kg/MT and maximum of 105.64 Kg/MT.

TABLE: 23 STUDY OF KOCHI CITY: PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	11.62	40.65	0.77	3.99	1.28	0.54	58.85
DAY 2	12.22	45.42	2.29	1.19	3.79	1.99	66.9
AVERAGE	**11.92**	**43.035**	**1.53**	**2.59**	**2.535**	**1.265**	**62.88**

In Kochi, the assessment and quantification of plastics waste was conducted at Brahmapuram dump sites having the total MSW of about 150MT/Day and the plastics were assessed as with an average of 62.88 Kg/MT. The survey data is represented in table 23, which reveals the majority of plastics are PET, HDPE/LDPE. The PET is of about 18.9% comprising of water bottles and others and HDPE/LDPE is of about 68.4% which comprises of carry bags, milk pouches and Packing films. The data obtained with a minimum of 58.85 Kg/MT and a maximum of 66.90 Kg/MT. The collected MSW was directly dumped without any post treatment operation. During survey it has been observed that the plastics are segregated by the rag pickers and separated, dumped in the dump yards without any disposal system.

TABLE: 24 STUDY OF MADURAI CITY: PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	1.44	40.71	4	2.49	3.9	0.24	52.78
DAY 2	1.00	35.82	3.04	4.5	2.68	1.36	48.4
AVERAGE	**1.22**	**38.265**	**3.52**	**3.495**	**3.29**	**0.8**	**50.59**

In Madurai, the total collection of MSW was about 450 MT/Day. The quantified average plastics waste in madurai city was observed as 50.59 Kg/MT and reported in table 24. About 75% of HDPE/LDPE was observed in total PW. The data generated with a minimum plastics waste of about 48.40 Kg/MT and with a maximum plastics waste generation of about 52.78 Kg/MT.

TABLE: 25 STUDY OF PORT BLAIR CITY: PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	17	73.44	9.54	0.38	0.25	0.15	100.76
AVERAGE	**17**	**73.44**	**9.54**	**0.38**	**0.25**	**0.15**	**100.76**

Total MSW that are generated in Port Blair city was about 45 MT/Day. The survey was conducted at Brokshadbad Dumpsite which has the average PW generation of 10.07 Kg/MT. The findings during the study are reported in Table P25.The PW generated from HDPE/LDPE/LLDPE is about 73.44 Kg/MT (around 72.8%).

TABLE: 26 STUDY OF THIRUVANANTHAPURAM CITY: PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	1.86	49.67	0.62	4.11	1.37	1.52	59.15
DAY 2	4.53	35.79	2.79	4.71	1.23	12.23	61.28
AVERAGE	**3.195**	**42.73**	**1.705**	**4.41**	**1.3**	**6.875**	**60.22**

In Thiruvananthapuram, the assessment and quantification of plastics waste was conducted at Vilappilsala dump sites having the total MSW of about 250 MT/Day, and the plastics were assessed as with an average of 60.22 Kg/MT. The survey data is represented in table 26, which revealed there the majority of plastics in HDPE/LDPE which is about 71%. Comprising of carry bags, milk pouches and Packing films. The data obtained with a minimum PW of 59.15 Kg/MT and a maximum of 61.28 Kg/MT.

TABLE: 27 STUDY OF PUDUCHERRY CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	4.28	91.56	2.44	4.96	5.64	0.62	109.5
DAY 2	4	85.52	2.24	4.06	3.6	0.4	99.82
AVERAGE	**4.14**	**88.54**	**2.34**	**4.51**	**4.62**	**0.51**	**104.66**

In Puducherry, Karuvadikuppam dumping yard has been selected as the study area for this project. The study revealed that average total Plastic waste generation in Puducherry was about 104.66Kg/MT represented in Table 27. It has been worked out from the survey data about 84.5% of total plastics waste is generated from HDPE/LDPE materials. The Total MSW generated in this city was with an average of 250 MT/ Day. During the survey the minimum plastic waste generation 99.82 Kg/MT and maximum of 109.50 Kg/MT

TABLE: 28 STUDY OF KAVARATTI CITY : PW(Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1&2	23.5	74.75	4.5	18.83	1	0.417	123
DAY 3	20.13	77.63	5.625	14.87	0.475	0.125	118.85
AVERAGE	**21.815**	**76.19**	**5.063**	**16.85**	**0.738**	**0.271**	**120.92**

In Kavaratti , the survey was conducted at Common Depository Place which has the average total MSW generation was around 24 MT/Day out of the average PW was generated about 120.92 Kg/MT. The data which are classified according to the codes of plastics, represented in the table 28. The data showed that the HDPE/LDPE plastics having the code of 2 &4 has the majority of about 62.55%.The field study obtained with a minimum figure of average PW of 111.50 Kg/MT and a maximum of 139.50 Kg/MT. An incinerator of 50 Kg capacity installed for burning of plastic waste, near to the dump site.

TABLE: 29 STUDY OF HYDERABAD CITY: PW(Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	4.975	22.103	1.650	5.075	0	3.000	36.81
DAY 2	7.05	39.35	5.85	4.575	0	8.135	64.96
DAY 3	3.975	25.475	2.225	2.1	0	3.95	37.73
DAY 4	4.9	32.8	3.95	2.825	0	5.875	50.35
AVERAGE	**5.225**	**29.932**	**3.4188**	**3.6438**	**0**	**5.24**	**47.46**

In Hyderabad, the survey was conducted at Jawaharnagar dumpsite, which has the average total MSW generation was around 4200 MT/Day out of the average PW was generated about 47.46Kg/MT. The classified data for different types of plastics waste are represented in Table 29. From the study data it has been observed about 63.21% of PW was obtained from the recycling codes of 2 and 4 which is of HDPE/LDPE Material.

In Hyderabad, the MSW collected from various locations of city are transported to Jawaharnagar dumpsite where 50 families of rag pickers are living nearby dumpsite and segregating the PW and selling to the reprocessors.

TABLE: 30 STUDY OF VIJAYAWADA CITY: PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	4.432	52.148	3.264	5.044	1.188	0.2	66.276
DAY 2	2.584	61.416	1.128	12.932	4.488	2.112	84.66
DAY 3	4.996	52.352	2.844	5.352	1.728	0.4	67.672
AVERAGE	**4.004**	**55.305**	**2.412**	**7.776**	**2.468**	**0.904**	**72.87**

In Vijayawada, the survey was conducted at Pathapadu Pit No.10, which has the average total MSW generation was around 600 MT/Day out of the average PW was generated about 72.87 Kg/MT. The classified data for different types of plastics waste is represented in Table 30. From the study data it has been worked that about 76% of PW was obtained from the recycling codes of 2 & 4 which is of HDPE/LDPE Material. The waste was collected at the transfer stations located at sinshnagar , Where about 100 Nos. of Ragpickers picks valuable plastics and then the MSW is dumped in the dump yard and about 20 vermiculture plants are there which uses wet waste. In addition to that a fuel gas Plant (Bio-Gas) operated by M/S. Shivram Energy system Pvt. Ltd is present near to the dumpsite which is currently not working.

TABLE: 31 STUDY OF VISHAKHAPATTNAM CITY:PW(Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	2.32	69.52	2.368	14.32	2.288	0.896	91.712
DAY 2	3.08	74.768	2.08	15.28	3.656	0.56	99.424
DAY 3	1.536	71.84	1.12	10.48	0.64	0.744	86.36
DAY 4	6.584	66.144	0.432	7.48	3.192	0	83.832
AVERAGE	**3.38**	**70.568**	**1.5**	**11.89**	**2.444**	**0.55**	**90.33**

The study data on Kapuluppada dumping ground of Vishakapattnam generated an average PW of about 90.33 Kg/MT. The data is shown in table 31; Out of about 78% comprise HDPE/LDPE materials with a minimum plastics waste generation 83.83 Kg/MT and with maximum of 99.42 Kg/MT. The Total MSW generated in this city was with an average of 334 MT/ Day. Near by dumpsite M/S. Marine Eco-Industries is operating, where they collect and treat the medical waste. The average total municipal solid waste generated is compared with the percentage of average plastics municipal solid waste obtained in each city is shown in Chart 2.

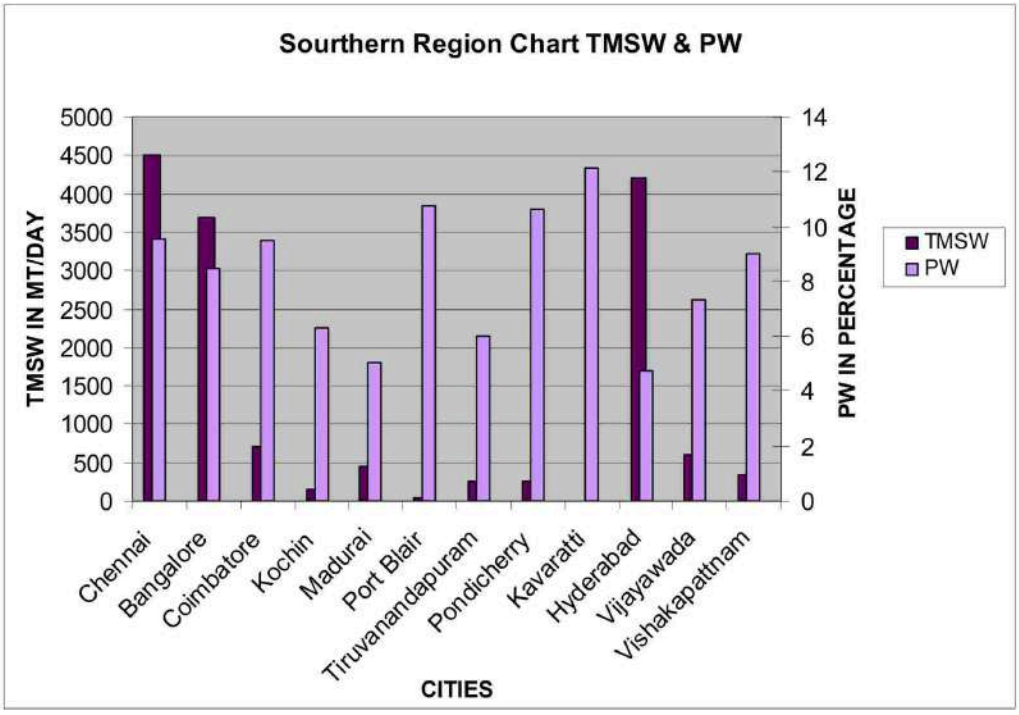


CHART 2: SOURTHERN REGION

TMSW GENERATION Vs PW GENERATION

4C. Western Region: The cities selected to carry out assessment and quantification of Plastics waste in the western region of the country are Ahmedabad, Daman, Dwaraka, Gandhinagar, Mumbai, Nashik, Panjim, Pune, Rajkot, Silvassa, Surat, Vadodara, & Jaipur

TABLE: 32 STUDY OF AHMEDABAD CITY: PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	1.344	82.752	1.648	9.792	0.496	0	96.032
DAY 2	0	102.08	0	3.712	8.32	0	114.112
AVERAGE	**0.672**	**92.416**	**0.824**	**6.752**	**4.408**	**0**	**105.07**

The field study in Ahmadabad was carried out in co-operation with Ahmedabad Municipal Corporation (AMC) in the place of Pirana dump site where the total MSW is dumped @ 2300 MT/Day. The survey reported an average PW of about 105.07 Kg/Tons, shown in Table 32 in which 92.416 Kg/MT (88%) belongs to code of 2 and 4, i.e. HDPE/LDPE Plastics waste comprises of carry bags, milk pouches, packing items etc. The study revealed that the average PW produced with a minimum and maximum of 96.032 Kg/MT and 114.11 Kg/MT respectively. During the study it is observed that Organic waste is treated separately to manufacture organic fertilizer. Refused Derived Fuel –RDF is also manufactured in nearby plant & supplies to local industries. GAS based power plant is also situated at site which helps to reduce the total quantity of Municipal solid waste generated. RDF plants nearer to the dumpsite which is operated by M/S. EXCEL under contract. Composting is done to promote derivation of organic manure from waste and to reduce the quantity of waste going to landfill site and also to help agricultural production; Waste to RDF (Refuse Derived Fuel) Plant by UPL DJAI Power Ltd. This RDF is used in Boiler for substitute for Coal, Lignite, Wood, Oil etc.

TABLE: 33 STUDY OF DAMAN CITY: PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	0	27.28	0.112	0	13.44	9.856	50.688
DAY 2	0.664	34.12	1.112	6.152	0.372	2.816	45.236
DAY 3	1.168	39.2	0	0.84	1.56	0.424	43.192
AVERAGE	**0.611**	**33.53**	**0.408**	**2.331**	**5.124**	**4.365**	**46.37**

In Daman, the field study on quantification of plastics waste was carried at the back side of fort. The PW obtained during the survey was about 46.37 Kg/MT where the TMSW generated @ 25 MT/Day the data's shown in table 33.

It is observed during the study that the plastics waste littered more in the city and only few number of collection points are available in the city and there is no proper dumping ground available in the city, at present the TMSW generated in the city are dumped at fort back side. The study reported that the HDPE/LDPE plastics had more quantity of packing items which was about 75%.

TABLE: 34 STUDY OF DWARKA CITY:PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	16.59	48	5.2	3.15	9.01	13.3	95.25
DAY 2 & 3	8.23	43.63	2.13	3.68	7.44	3.71	66.32
AVERAGE	**12.403**	**45.813**	**3.6667**	**3.3973**	**8.384**	**8.52**	**80.79**

In Dwarka, the study was carried out at Old Charakala Road (Vermi Plant Compost) where the TMSW are dumped and they are used at vermin compost plant. The Data obtained during the study are represented in Table 34. The Total Municipal waste generated was about 18 MT/Day out of which the PW generated was about 80.79 Kg/MT (8.07%). It is observed that lot of plastics films, carry bags littered on the main roads, streets of the city.

TABLE: 35 STUDY OF GANDHINAGAR CITY: PW (Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	0.76	55.34	1.802	3.02	4.16	0.12	65.20
DAY 2	0.87	35.21	0.68	0.506	0.331	0.91	38.50
DAY 3	0.675	24.51	0.35	1.05	13.54	0.35	40.48
AVERAGE	**0.77**	**38.35**	**0.944**	**1.525**	**6.010**	**0.460**	**48.06**

In Gandhinagar, the dumpsite located in Sector 28, Opp to Electronic Park City, The average PW generated in Gandhinagar was about 48.06 Kg/MT. The MSW of the Data obtained during the study is represented in Table 35. The Total Municipal waste generated was about 97 MT/Day. The data obtained with the minimum PW of about 28.14Kg/MT and the maximum PW of about 65.20 Kg/MT. The field study report shows that, the MSW is directly dumped in the dumping yard without any post treatment operations. The maximum PW obtained as HDPE/LDPE waste like Carry bags, Packing Pouches etc.

TABLE: 36 STUDY OF MUMBAI CITY: PW (Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	6.234	37.65	2.32	9.984	0.832	4.548	61.57
DAY 2	3.45	54.34	3.23	5.78	2.63	4.72	74.15
DAY 3	2.79	69.39	0.79	1.49	2.17	2.24	78.89
DAY 4	3.17	30.31	1.425	0.61	0.235	0.43	36.18
DAY 5	2.68	28.08	3.324	2.816	4.88	13.01	54.8
DAY 6	2.776	60.17	2.252	1.328	1.82	2.94	71.29
AVERAGE	**3.517**	**46.6517**	**2.224**	**3.668**	**2.095**	**4.648**	**62.813**

The field study in Mumbai was carried out in two dumpsite located at Mulund and Deoner. The MSW Collected at Deoner Dumpsite was three times more than than Mulund Dumpsite. The Average PW studied at the both dumpsites is reported in the Table 36. The Total Municipal solid waste collected at both the dumpsites was about 6500 MT/Day. The average PW generated was about 62.81 Kg/MT. The dumpsite was observed with huge nos. of Rag pickers who collects the valuable plastics waste like Polybags, PET Bottles, Sacks, Milk Pouches, rubber & Foam slippers etc, and it's observed that Metalized pouches were not collected by rag pickers.

TABLE: 37 STUDY OF NASIK CITY PW (Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	1.108	47.00	0.648	5.244	2.396	0	56.39
DAY 2 & 3	1.349	50.25	0.355	4.24	3.77	0.075	60.04
AVERAGE	**1.229**	**48.625**	**0.502**	**4.742**	**3.083**	**0.038**	**58.22**

In Nasik, the survey was conducted at Patharadi, which has the average total MSW generation was around 350 MT/Day out of the average PW was generated about 58.22 Kg/MT. The classified data for different types of Plastics waste are represented in Table 37. From the study data it has been worked that about 83.57% of PW was obtained from the recycling codes of 2 and 4 which is of HDPE/LDPE Material.

In dumpsite of Nashik, the following post treatment plants are present (1) Inert Processing unit (2) Bio Gas Plant unit (3) Pre sorting unit (4) Dead Animal Incineration unit (5) Refused Derived Fuel unit (RDF) (6) Compost Manure Unit (Finished product unit) the MSW collected from various location of city post treated and corresponding outputs are produced.

TABLE: 38 STUDY OF PANJIM CITY PW (Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	1.6	20.22	1.92	12.16	0.64	2.56	39.1
DAY 2	1.44	23.04	2.32	7.76	7.04	4	45.6
DAY 3	4.32	31.76	4.544	1.92	3.52	3.36	49.424
AVERAGE	**2.453**	**25.01**	**2.928**	**7.28**	**3.733**	**3.31**	**44.71**

In Panjim, the field study on quantification of plastics waste was carried at the Animal welfare centre. The PW obtained during the survey was about 44.71 Kg/MT where the TMSW generated @ 25 MT/Day. The data obtained on the segregated plastics are given in table 38. The majority of Plastics waste obtained as Poly bags, Packaging plastics the average of about 55.9%.The average PW resulted with a minimum of about 39.1Kg/MT and a Maximum of about 49.42 Kg/MT. In Panjim, the Bio-Compost Plants are present, almost all the municipal solid waste generated in the city are treated after the completed segregated of plastics and manure is produced as final product.

TABLE: 39 STUDY OF PUNE CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	0.4	76.348	0.48	2.852	1.12	0	81.2
DAY 2	1	78.804	0	0.36	1.992	0	82.156
DAY 3	0.72	74.416	0.956	1.304	1.796	0.08	79.272
DAY 4	0	67.76	0	1.088	0.4	0	69.248
AVERAGE	**0.530**	**74.332**	**0.359**	**1.404**	**1.327**	**0.020**	**77.969**

In Pune, Fursangi Processing Plant, (Hanjar Bio-Tech Energy Ltd.) have been selected as the study area for this project. The study revealed that average total Plastic waste generation in Pune was about 77.96 Kg/MT represented in Table 39. It has been worked out from the survey data about 95% of total plastics waste is generated from HDPE/LDPE materials. The Total MSW generated in this city was with an average of 1300 MT/ Day. During the survey the Minimum Plastic waste, generation is about 69.25 Kg/MT and Maximum of 91.09 Kg/MT. Waste Collected from 85 wards of Pune city from various location are transferred to 4 transfer stations located at different locations, Finally the MSW are transported To Fursungi Processing Plant Operated by Hanjar Bio-Tech Energy Ltd. supplied to vermi-compost plants-12 Nos. Currently, no dumping of waste is done, all MSW are post treated, at Fursungi Processing Plant and produce products like Plastics to Diesel, Plastics Recycled Granules, Sand, Refused Derived Fuel, Compost Fertilizers.

TABLE: 40 STUDY OF RAJKOT CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	8.1045	50.556	4.48	1.888	1.952	2.333	69.31
DAY 2	7.856	33.952	0.848	0.976	0.828	24.132	68.592
DAY 3	6.984	44.22	.332	0.664	3.66	9.076	69.936
AVERAGE	**7.648**	**42.91**	**3.553**	**1.176**	**2.147**	**11.85**	**69.28**

In Rajkot, the survey was conducted at 100 Ft Road & 80 Ft Road Dumpsites, which has the average total MSW generation, was around 230 MT/Day out of the average PW was generated about 69.28 Kg/Day. The data for different types of Plastics waste are represented in Table 40. From the study data it has been worked that about 62.06% of PW was obtained from the recycling codes of 2 & 4 which is of HDPE/LDPE Material. At dumpsite of Rajkot, the MSW collected from various locations of city are transported to three different stations where PW is segregated. The remaining MSW is finally transported to the dumpsite ground.

TABLE: 41 STUDY OF SILVASSA CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	3.24	52.75	9.448	0.412	1.64	4.88	72.36
DAY 2	1.944	34.288	0.728	0.224	10.064	0.928	48.17
DAY 3	11.136	47.94	0	0	3.712	0	62.79
AVERAGE	**5.440**	**44.993**	**3.392**	**0.212**	**5.139**	**1.936**	**61.107**

In Silvassa, the field study on quantification of plastics waste was carried at the khadoli Village. The PW obtained during the survey was about 61.12 Kg/MT

where the TMSW generated @ 35 MT/Day. The data obtained is reported in table 41. There is no proper dumping ground available in the city, at present the TMSW generated in the city collected zone wise and dumped at khadoli Village. The study reported that the HDPE/LDPE plastics had more quantity of packing items which was about 73.3%. The study data revealed that the average PW with a minimum figure of 31.94 Kg/MT and maximum of 79.45 Kg/ MT.

TABLE: 42 STUDY OF SURAT CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	0.887	131.67	1.524	0.678	1.622	2.3974	138.773
DAY 2	2.326	116.68	0.953	0.744	1.496	2.7288	124.920
DAY 3	0.561	105.07	0.246	0.628	1.066	2.798	110.3598
AVERAGE	**1.258**	**117.8**	**0.908**	**0.683**	**1.397**	**2.644**	**124.68**

In Surat, the survey was conducted at varachha and Anjana sites, which has the average total MSW generation, was around 1200 MT/Day out of the average PW was generated about 124.68Kg/MT (12.46%). The classified data for different types of Plastics waste is represented in Table 42. From the study data it shows that about 94.44% of PW was obtained from the recycling codes of 2 and 4 which is of HDPE/LDPE Material. The Municipal Corporation has six different transportation sites, where the MSW are collected from different zones and the Plastics and foot wears are segregated before dumping in the dumping ground. The Municipal Corporation has recruited rag pickers on each transportation site for the segregation of value added plastics and other materials. As per information received from Surat Municipal Corporation, the primary segregation of Plastic waste is carried out by the waste collection and secondary segregation is done at the transportation site. Finally the remaining MSW are dump at the dumping ground.

TABLE: 43 STUDY OF VADODARA CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	0	48.90	1.69	0.565	2.97	1.13	55.26
DAY 2	0.27	30.11	0.97	0.64	4.78	6.13	42.89
DAY 3	0.988	28.096	2.64	0.704	3.90	2.584	38.912
AVERAGE	**0.42**	**35.70**	**1.76**	**0.64**	**3.883**	**3.280**	**45.69**

The field study in Vadodara was carried out at Makarpura Tarsali Bye Pass NH.8 where the total MSW is dumped @ 600 MT/Day. The survey reported an average PW of about 45.69 Kg/Tons, shown in Table 43 in which 36.65 Kg/MT (79%) belongs to code of 2 and 4, i.e. HDPE/LDPE Plastics waste comprises of carry bags, Milk Pouches, Packing items etc. The study revealed that the average PW produced with a minimum and maximum of 33.22 Kg/MT and 67.57 Kg/MT respectively.

TABLE: 44 STUDY OF JAIPUR CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	3.349	31.83	6.043	9.56	9.26	11.75	71.79
DAY 2	0.89	37.11	0.320	7.632	3.059	8.552	57.56
DAY 3	0.440	19.00	0.357	3.827	2.045	9.555	35.226
DAY 4	0.699	15.49	1.059	4.280	0.683	5.091	27.307
DAY 5	4.600	16.259	3.765	16.288	3.579	14.109	58.600
DAY 6	1.560	16.083	7.309	15.133	2.240	8.755	51.080
AVERAGE	**1.922**	**22.63**	**3.142**	**9.45**	**3.479**	**9.635**	**50.26**

In Jaipur , the survey was conducted at Meena Transport Site which has the average total MSW generation was around 310 MT/Day out of the average PW was generated about 50.26 Kg/MT. The data which are classified according to the codes of plastics, represented in the table 44. The data shows that the HDPE/LDPE plastics having the code of 2 &4 has the majority of about 46%. The field study obtained with a minimum figure of average PW of 17.68 Kg/MT and a maximum of 79.78 Kg/MT. Scrap dealers collect the material of plastic which can be recycled like LDPE, PP but the coloured PET bottles are left over in the dumping site. It is observed that there is No post treatment Plant in Jaipur City. The average total municipal solid waste generated is compared with the percentage of average plastics municipal solid waste obtained in each city is shown in Chart 3.

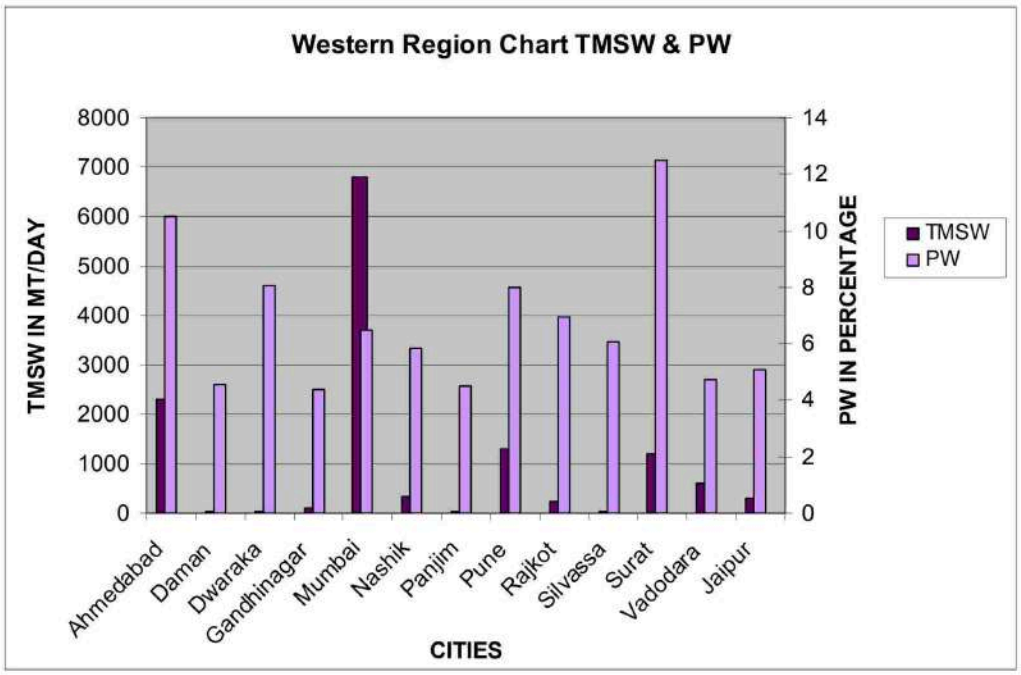


CHART 3: WESTERN REGION

TMSW GENERATION Vs PW GENERATION

4D. In the EASTERN REGION of the country, the cities selected to carry out assessment and quantification of Plastics waste are Asansol, Bhubaneswar,

Kolkata, Guwahati, Imphal, Gangtok, Aizwal, Itanagar, Kohima, Shillong and Agartala.

TABLE: 45 STUDY OF ASANSOL CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	7.451	34.98	4.032	7.124	6.8	2.952	63.34
DAY 2	2.712	36.66	11.675	3.491	3.738	2.52	60.80
DAY 3	3.954	33.87	5.544	2.52	4.99	5.28	56.16
AVERAGE	**4.706**	**35.17**	**7.084**	**4.378**	**5.176**	**3.584**	**60.09**

The Assessment and Quantification of plastics waste at Asansol was carried out at Kalpahari, where the average TMSW generated at the rate of 210 MT/Day the majority of plastics reported as HDPE, LDPE and PVC. Ethylene based plastics obtained about 58.95%, Vinyl based plastics obtained about 12.5%. The total average PW obtained about 60.09 Kg/MT with the Minimum average PW of about 42.10 Kg/MT and Maximum of about 82.19 Kg/MT. The data obtained during the survey are depicted in table 45. The solid waste management and waste disposal has been put up effectively as a project by west Bengal state government for the following five regions that includes Asansol and its adjoining areas Raniganj, Durgapur, Asansol, Kulti and Tamulia. Each of these has their own treatment plants where they segregate the biodegradable, non-Biodegradable and recyclable waste.

TABLE: 46 STUDY OF BHUBANESWAR CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	21.701	30.68	3.72	7.43	8.72	6.64	78.89
DAY 2	25.01	29.26	5.46	4.328	5.18	6.74	75.99
DAY 3	28.95	23.31	6.32	5.67	2.47	3.73	70.45
DAY 4	23.71	25.96	4.87	10.49	3.36	3.23	71.62
DAY 5	31.91	34.056	9.94	10.25	3.95	11.90	102.00
AVERAGE	**26.26**	**28.65**	**6.061**	**7.64**	**4.74**	**6.45**	**79.79**

The study data on bhuasuni dumping ground of Bhubaneswar generated an average PW of about 79.79Kg/MT. Out of about 36% comprise HDPE/LDPE and 32.9% PET plastic waste with a minimum plastics waste generation 67.30 Kg/MT and with maximum of 111.82 Kg/MT. The Total MSW generated in this city was with an average of 400 MT/ Day. The generated data is shown in Table 46. In Bhubaneswar the waste from the dumping ground is sent to ACC Cement kilns for utilization of plastics as fuel in cement kilns. But the company is situated at Bargadh i.e. about 500 km far from city. A parallel level of recycling unit is operated in and around Malisahi Basti. It has been observed that hundred of wholesale dealers, rag pickers and garbage lifters for sorting, segregating and cleaning the waste for further recycling process.

TABLE: 47 STUDY OF KOLKATTA CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	1.760	99.97	3.333	2.587	4.480	4.000	116.13
DAY 2	2.4	78.36	1.4	1.52	4.2	0.24	88.12
DAY 3	1.27	86.03	3.39	1.39	2.80	1.20	96.07
DAY 4	2.533	143.013	1.867	2.533	6.347	4.720	161.013
DAY 5	1.23	99.32	2.27	1.88	2.10	2.99	109.79
AVERAGE	**1.797**	**102.98**	**2.526**	**2.015**	**3.97**	**2.8**	**116.09**

In Kolkata, the assessment and quantification of plastics waste was conducted at dump site located at Dhapa Check Post, Near Science City having the total MSW of about 3670 MT/Day, and the plastics municipal solid waste were assessed as with an average of 116.09 Kg/MT. The survey data is represented in table 47, which reveals that the majority of plastics in HDPE/LDPE which is about 88.7%, comprising of carry bags, milk pouches and Packing films. The data obtained with a minimum PW of 78.40 Kg/MT and a maximum of 177.60 Kg/MT.

TABLE: 48 STUDY OF GUWAHATI CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	8.8	29.28	0.808	6.48	1.4	1.2	47.97
DAY 2	3.392	29.52	0.00	1.64	3.208	2.32	40.08
DAY 3	10.88	22.13	2.48	1.68	1.52	6.33	45.02
DAY 4	13.84	32.04	1.12	1.6	6.64	1.02	56.26
DAY 5	6.392	34.14	2.18	2.98	4.12	2.34	52.15
DAY 6	7.102	39.59	3.02	4.13	3.18	2.96	59.98
DAY 7	7.392	34.12	0.00	2.8	4.102	2.62	51.034
AVERAGE	**8.257**	**31.54**	**1.373**	**3.044**	**3.45**	**2.68**	**50.36**

Total MSW that are generated in Guwahati city was about 204 MT/Day. The survey was conducted at Boragoan Dumpsite which has the average PW generation of 50.36 Kg/MT. Around 62.6 % of total plastics waste is generated from HDPE/LDPE/LLDPE. The average PW obtained with the Minimum of 40.08 Kg/MT and Maximum of 59.98 Kg/MT. The classified average PW is given in Table 48. In Borogaon dumpsite extreme segregation is done and plastics are taken out from the municipal solid waste by the rag pickers. The plastics like PET bottles, HDPE containers, bottle closures, PP disposable items , CD's, packaging plastics usually of thickness more than 40 microns are picked up, cleaned and in bulk is sold to scrap dealers. More concern is about metalized plastics which are not picked up and can be seen all round the dumpsites. The Assam Gas Cracker Project is going to come up 2011-2012. Due to this many downstream plastics industries are expected to come up. In Guwahati CIPET PWMC is working in full swing with the vision to give complete solution for the disposal of waste plastics. Other concerns like M/S. Jagriti industries are also working towards recycling of

plastics waste. In Guwahati a compost manufacturing plant is also erected at the dumpsite.

TABLE: 49 STUDY OF IMPHAL CITY PW (Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	10.85	33.13	1	3.37	7.21	2.94	58.5
DAY 2	10	30.79	0.9	5.445	1.2	0.67	49.005
DAY 3	11.67	25.36	2.33	2.28	1.02	2.34	45
DAY 4	14.34	29.96	1.32	1.4	4.39	1.38	52.79
AVERAGE	**11.715**	**29.81**	**1.3875**	**3.1238**	**3.455**	**1.8325**	**51.32**

In Imphal, the plastics assessment and quantification study was conducted at Lamphel,. The finding reveals that total MSW was about 120 MT/Day. The PW was observed as 51.32 Kg/MT out of the majority of Plastics waste found as carry bags and packaging pouches which is of 58.45% belong to the HDPE/LDPE material. The field study reveals that the Minimum Plastic waste generation 45.00 Kg/MT and Maximum of 58.50 Kg/MT. The study data on quantification of plastics waste is reported in Table 49. The contribution of plastics waste towards the total solid waste generated is no more negligible. Any programme like awareness programme regarding recycling and environment can go a long way in sustaining the presence of plastics in this beautiful region.

TABLE: 50 STUDY OF GANGTOK CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	19.925	16.68	7.06	24.66	5.56	4.54	78.42
DAY 2	19.43	26.08	9.945	28.00	4.00	7.115	94.56
DAY 3	16.00	29.45	11.5	26.67	6.50	8.12	98.25
DAY 4	21.00	22.23	8.00	26.00	4.555	5.005	86.79
AVERAGE	**19.09**	**23.61**	**9.126**	**26.33**	**5.154**	**6.195**	**89.51**

The MSW generated in Gangtok was about 26 MT/Day. The study data on Lower Martham dumping ground of Gangtok generated an average PW of about 89.51 Kg/MT. Out of about 26.33% comprise PP waste consisting of Wheel covers, Woven Sacks, Electrical Items Covers, Box Container Disposable Cups, 23.61% of HDPE/LDPE waste consists of Polybags, Packing Items etc, 19.09% of PET Bottles. The survey data resulted with a minimum plastics waste generation 78.43 Kg/MT and maximum of 98.25 Kg/MT. The data of the field study on plastics quantification is shown in table 50. The Sikkim Government has banned the carry bags but still it is observed that the quantities of plastics packaging materials are littered in Gangtok. At Lower Martham Dumpsite, two types of MSW waste is collected namely dry and wet waste. The extreme segregation is done at the dumpsite and all types of plastics waste is sold to the scrap dealers of Silliguri. Compost treatment plant is not in working condition nearer to dumpsite.

TABLE: 51 STUDY OF AIZWAL CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	20.025	15.02	5.085	26.06	6.27	7.115	79.575
DAY 2	15.025	17.11	11.575	15.21	10.27	9.615	78.805
DAY 3	15.52	14.52	8.59	18.56	9.92	9.695	76.805
DAY 4	10.025	22.52	5.085	28.575	8.77	7.745	82.72
AVERAGE	**15.15**	**17.30**	**7.589**	**22.10**	**8.807**	**8.543**	**79.48**

In Aizawal, the field survey was carried out at Tuirial dumping site, where the dumping of average total MSW of about 107 MT/Day. The data reveals that about 79.48 Kg/MT of PW was generated represented in table 51. However 21.6% plastics waste is generated from HDPE/LDPE materials consists of carry bags, household Items & multilayer films, 19.04% plastics waste is generated from PET. The minimum plastics waste generated of about 76.81 Kg/MT and Maximum of about 82.72 Kg/ MT.

TABLE: 52 STUDY OF ITANAGAR CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	14.02	30.2	0.27	3.11	4.39	2.16	54.15
DAY 2	12.89	30.27	1.02	3.12	3.96	1.02	52.28
DAY 3	11.86	33.06	0.96	2.06	5.12	1.06	54.12
AVERAGE	**12.923**	**31.177**	**0.75**	**2.7633**	**4.49**	**1.4133**	**53.52**

Karsengsa Place has been selected as study area. The average total Plastic waste generation in Itanagar was found about 53.52 Kg/MT reported in Table 52.

Around 59.3% of total plastics waste is generated from HDPE/LDPE materials. The Total MSW generated in this city was with an average of 102 MT/Day. During the survey the minimum plastic waste generation 52.28 Kg/MT and maximum of 54.15 Kg/MT.

TABLE: 53 STUDY OF KOHIMA CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	10.5	30.24	0.67	2.5	4.5	10.65	59.06
DAY 2	9.23	32.3	2.5	3.08	0.39	2.5	50
DAY 3	10.75	21	0	12	2.09	1.83	47.67
DAY 4	6	27.7	2.3	1.4	2.76	3.62	43.78
AVERAGE	**9.12**	**27.81**	**1.3675**	**4.745**	**2.435**	**4.65**	**50.13**

The quantification of plastics waste carried out at Kohima Dumping ground, the study revealed that average total plastic waste generation in Kohima was about 50.13 Kg/MT shown in Table 53. Around 55.4% of total plastics waste is generated from HDPE/LDPE materials. The Total MSW generated in this city was with an average of 45 MT/ Day. During the survey the minimum Plastic waste generation 43.78 Kg/MT and Maximum of 59.06 Kg/MT.

TABLE: 54 STUDY OF SHILLONG CITY PW (Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	11.87	31.1	0	2.2	8.14	3.1	56.41
DAY 2	9.97	33.3	0.98	1.1	5.2	2.01	52.56
DAY 3	14.66	29.53	1.92	2.12	4.02	2.52	54.77
DAY 4	8.23	33.12	3.11	2.33	4.98	1.93	53.7
AVERAGE	**11.18**	**31.76**	**1.50**	**1.93**	**5.585**	**2.39**	**54.36**

In Shillong, the assessment and quantification of plastics waste was conducted at Borapani dump site having the total MSW of about 97 MT/Day, and the plastics was assessed as with an average of 54.36 Kg/MT. The survey data is represented in table 54, which shows that majority of plastics are PET, HDPE/LDPE. The PET is of about 20.57% comprising of water bottles & Medical bottles and HDPE/LDPE is of about 58.43% which comprises of carry bags, milk pouches and Packing films. The data obtained with a minimum of 52.56 Kg/MT and a maximum of 56.41 Kg/MT. The collected MSW was directly dumped without any post treatment operation. During survey it is observed that the plastics are segregated by the rag pickers and separated dumped in the dump yards without any post operations.

TABLE: 55 STUDY OF AGARTALA CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	3.915	40.5	1.91	1.91	1.165	6.05	55.45
DAY 2	0.00	60.55	0	0.55	3.50	1.8	66.4
DAY 3	2.72	43.96	0.72	.96	0.32	2.52	52.2
DAY 4	3.365	41.8	1.355	2.41	0.87	4.615	54.415
AVERAGE	**2.5**	**46.703**	**0.995**	**1.701**	**1.46**	**3.75**	**57.13**

In Agartala, the dumping site was selected for the plastics quantification field survey, which is located Happania. The field study provided the data, which represented an average PW of about 57.13 Kg/MT, where the total MSW generated in the city is of about 102 MT/Day. The data of segregated plastics waste is given in Table 55. The majority of plastics waste generated from HDPE/LDPE and Unclassified plastics has 81.7% and 6.56% respectively. Further it revealed from data, that the minimum quantity of plastics waste generation is about 52.20 Kg/ MT and a maximum of about 66.40 Kg/MT. The segregation of plastics waste is done at the dumpsite. Other degradable MSW is utilized in compost plant which is installed at the dumpsites and operated by M/S. Prayag group with municipal corporation Agartala. The segregated PW is sent to Kolkata. The Agartala Municipal Corporation has provided bins of three colours to many residential areas for collection of different types of waste, so that plastics may be reduced at the dumpsite. As the people are not properly aware, the practice of separation of degradable and Non-degradable is not practiced. Hence some awareness programme may also help to resolve the issue of waste plastics in Agartala.

The average total municipal solid waste generated is compared with the percentage of average plastics municipal solid waste obtained in each city is shown in Chart 4.

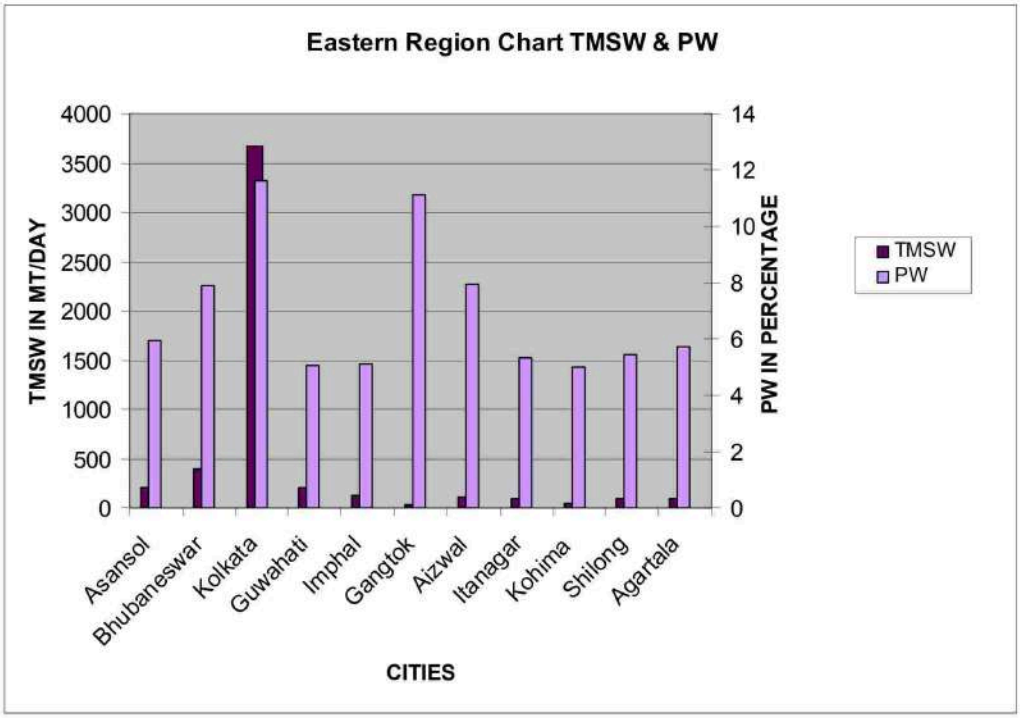


CHART 4: EASTERN REGION
MSW GENERATION Vs PW GENERATION

4E. In the CENTRAL REGION of the country, the cities selected to carry out assessment and quantification of plastics waste are Bhopal, Jabalpur, Nagpur, Raipur, Indore

TABLE: 56 STUDY OF BHOPAL CITY PW (Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	0.68	39.07	2	14.4	1.12	0.52	57.79
DAY 2	0.416	45.872	0.68	16.832	0.2	1.04	65.04
DAY 3	0.072	32.008	1.384	32.624	0	0.76	66.848
DAY 4	0.144	61.944	4.048	12.68	2.04	0.712	81.568
DAY 5	0	41.76	3.632	11.72	1.24	0.12	58.472
AVERAGE	**0.2624**	**45.131**	**2.3488**	**17.651**	**0.92**	**0.6304**	**65.94**

In Bhopal, the average quantity of plastic waste has been assessed as 65.94 Kg/MT, which comprises of 68.44% of HDPE/LDPE, 26.76% of PP and 3.56% of PVC material, described in Table 56. The field survey was carried out at Bhanpur dumpsite where the TMSW dumped at the rate of 350 MT/Day. It has been observed that no post-treatment operation for MSW is done in the city and 100% of MSW is dumped as land-filling. The Bhopal Municipal Corporation and MPPCB stabilized compact packer for the welfare of rag pickers. Approximately 250 Rag pickers collects the valuable plastics waste generated though out the day.

TABLE: 57 STUDY OF JABALPUR CITY PW (Kg/MT)

SERIAL OF DAYS	1 PET	2 4 HDPE/LDPE	3 PVC	5 PP	6 PS	7 OTHER	TOTAL
DAY 1	0.304	44.23	2.88	10.88	1.72	1.34	61.35
DAY 2	0.1824	39.90	1.44	9.568	0.793	0.712	52.59
DAY 3	0.648	51.28	1.92	4.80	1.248	1.84	61.736
DAY 4	0.00	47.51	2.912	4.80	0.72	4.32	60.26
DAY 5	0.00	28.33	0.76	2.017	0.443	1.877	33.42
DAY 6	0.00	41.79	4.72	3.6	1.08	2.36	53.55
DAY 7	0.32	30.8	1.2	4.32	0.824	1.872	39.336
AVERAGE	**0.207**	**40.55**	**2.261**	**5.713**	**0.975**	**2.045**	**51.75**

In Jabalpur, the dumping site was selected for the plastics quantification field survey, which is located at Rental. The field study provided the data, which represented an average PW of about 51.75 Kg/MT, where the total MSW generated in the city is of about 400 MT/Day. The data for segregated plastics waste is given in Table 57. Further it revealed from the data, that the minimum quantity of plastics waste generation is about 33.42 Kg/ MT and a maximum of about 61.74 Kg/MT.

TABLE: 58 STUDY OF INDORE CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	2.552	43.2	0.92	24.46	3.968	3.064	78.168
DAY 2	2.08	48.8	0.8	18.88	2.4	4.4	77.36
DAY 3	3.024	38.08	1.04	30.05	5.536	1.728	79.46
DAY 4	1.128	33.52	12.95	27.39	2.112	8.00	85.104
DAY 5	15.84	39.016	3.84	38.51	18.16	4.784	120.15
AVERAGE	**4.924**	**40.52**	**3.91**	**27.86**	**6.44**	**4.39**	**88.05**

In Indore, the field study on quantification of plastics waste was carried at Devgudariya Trenching ground Nemavar road. The PW obtained during the survey was about 88.05 Kg/MT where the TMSW generated @ 720 MT/Day. The data obtained is resulted in table 58. There is no post treatment operations are performed in indore city. The study reported that the HDPE/LDPE & PP consumptions are more yields about 46.1% and 31.64% respectively. The study data revealed that the average PW resulted with a minimum figure of 77.36 Kg/MT and maximum figure of 120.15 Kg/ MT.

TABLE: 59 STUDY OF NAGPUR CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	6.272	53.96	1.00	8.464	7.152	0.616	77.46
DAY 2	4.80	52.16	2.64	9.56	4.24	0.472	73.87
DAY 3	0.00	66.00	1.456	5.28	3.20	0.96	76.89
DAY 4	1.632	43.2.	11.52	7.44	6.96	0.72	71.47
DAY 5	5.28	44.16	5.968	6.352	3.544	2.40	67.70
DAY 6	1.96	47.18	4.192	7.616	6.80	1.68	69.42
DAY 7	2.40	42.40	01.88	4.656	4.248	2.496	58.08
AVERAGE	**3.19**	**49.87**	**4.09**	**7.05**	**5.16**	**1.33**	**70.70**

In Nagpur, Municipal Corporation and State Pollution control Board jointly stabilized composite fertilizer Plant which is operated by M/S. Hanjar Bio-Tech Ltd. Further a plant operated by GIL for compacting the old municipal waste.The quantification of plastics waste survey was conducted bhadewadi dumping yard The Nagpur city collects the average MSW of about 650MT/Day, Out of that 70.70 Kg/MT was produced as average PW. The data resulted during the study is given in Table 59. The data shows the minimum PW of about 58.08 Kg/ MT and the maximum of about 77.46 Kg/MT.

TABLE: 60 STUDY OF RAIPUR CITY PW (Kg/MT)

SERIAL OF DAYS	PET	HDPE/LDPE	PVC	PP	PS	OTHER	TOTAL
DAY 1	1.496	106.1	4.624	34.8	6.328	2.97	156.3
DAY 2	1.728	88.384	7.104	46.8	8.048	1.04	153.1
DAY 3	1.264	123.8	2.152	22.84	4.608	4.91	159.56
DAY 4	2.52	45.68	3.768	25.9	2.744	1.112	81.73
DAY 5	2.04	22.93	0.528	51.78	3.904	0.184	81.37
DAY 6	2.04	19.31	0.68	17.31	4.56	2.45	46.34
DAY 7	1.376	14.26	2.776	37.01	5.66	2.98	64.06
AVERAGE	**1.78**	**60.06**	**3.09**	**33.78**	**5.12**	**2.23**	**106.07**

In Raipur, the plastics assessment and quantification study was conducted at Sarona, Ring road No.1, near Kharun River, The findings revealed that the total MSW was about 224 MT/Day. The PW was observed as 106.07 Kg/MT out of the majority of plastics waste found as carry bags and packaging pouches which is of 56.62% belongs to the classification of HDPE/LDPE material. The field study reveals that the minimum plastic waste generation is about 46.34 Kg/MT and maximum of 159.56 Kg/MT. The study data on quantification of plastics waste is reported in Table 60. The average total municipal solid waste generated is compared with the percentage of average plastics municipal solid waste obtained in each city is shown in Chart 5.

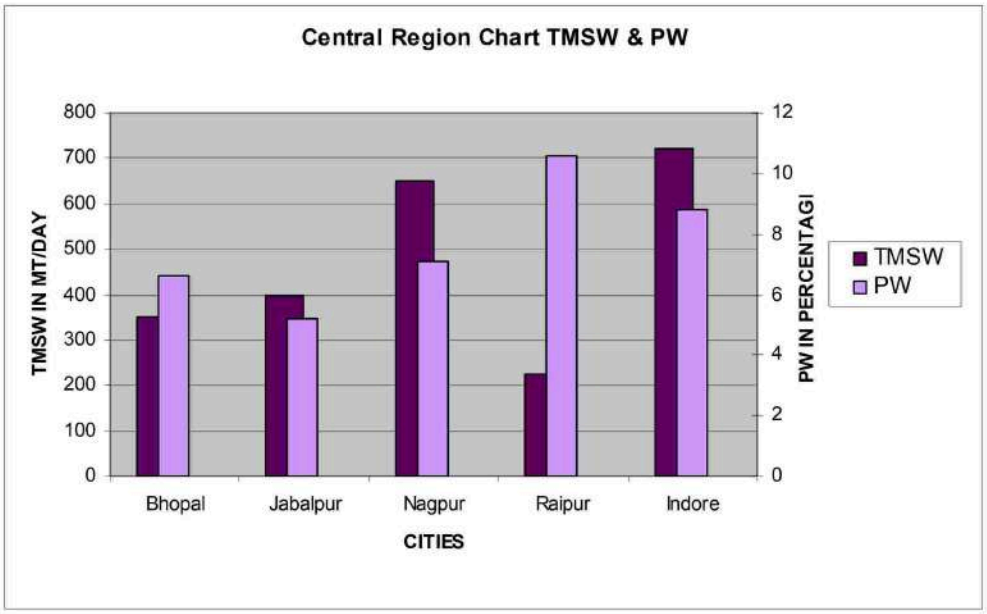


CHART 5: CENTRAL REGION
TMSW GENERATION Vs PW GENERATION

CONSOLIDATED CHART FOR TOTAL MSW and PW GENERATED AT 60 MAJOR CITIES OF INDIA

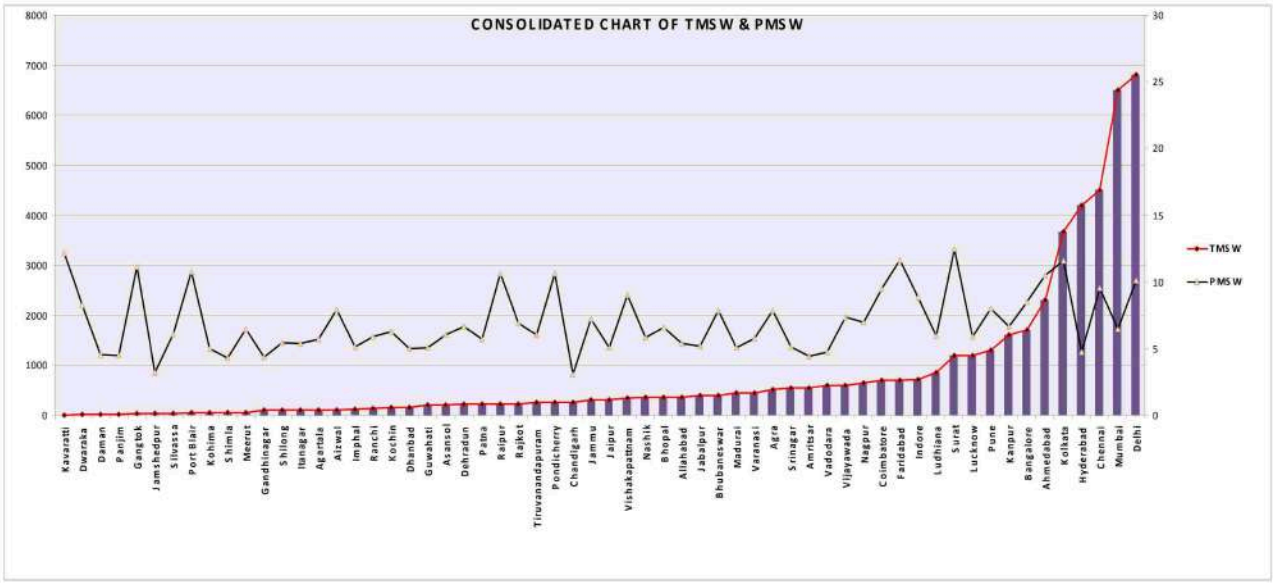


CHART 6: MSW GENERATION Vs PW GENERATION OF 60 CITIES

5. CURRENT INDIAN SCENARIO FOR COLLECTION, TRANSPORTATION AND DISPOSAL OF PLASTIC WASTE

The study observed that, the main practice used for waste collection is that the municipal and hired vehicles operated in various zones of the city on daily basis to collect the waste from the community bins. In this system, residents deposit their waste into the nearest community bins located at street corners at specific intervals. Waste generated in households is generally accumulated in small containers (often plastic buckets) and then disposed of into community bins. The waste is loaded into the vehicles from the community bins and finally, the waste is transferred to the disposal site. Before unloading the waste that is collected from the community bin, the vehicles were weighed on the weigh bridge located near the disposal site or in other areas. The weighing exercise was carried out on major cities and the daily waste quantity was computed and waste generation in kg/capital/day was calculated based on the urban population.

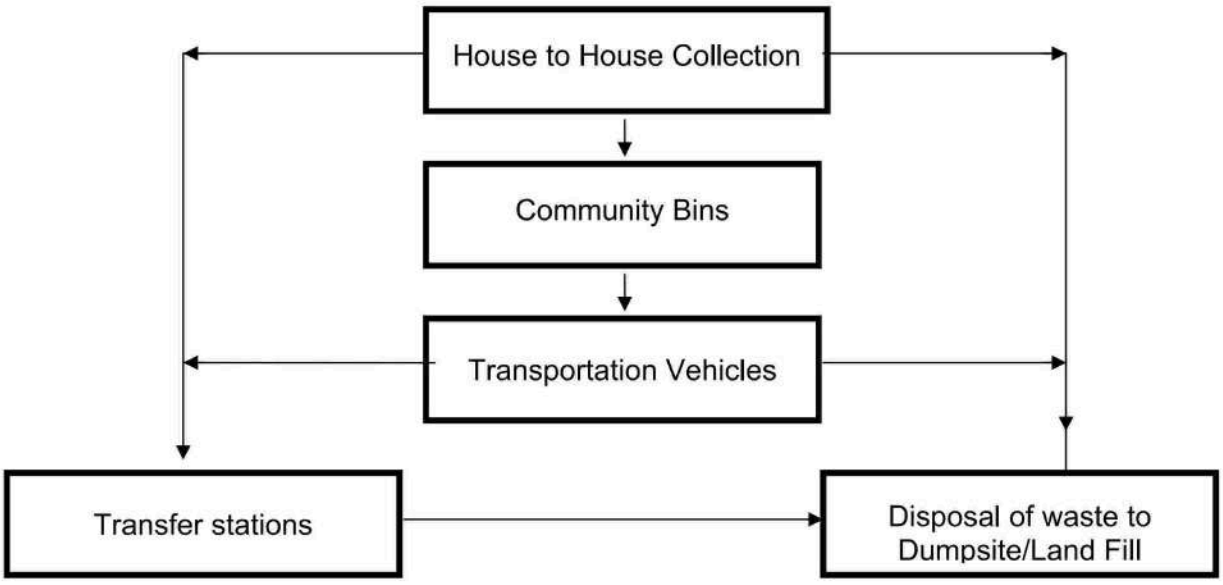
HOUSE-TO-HOUSE COLLECTION SYSTEM

House-to-house collection is system is adapted in few cities. In those cities that use house-to-house collection the waste that are collected from houses, offices, small shops and small markets. Here people are required to deposit their wastes in communal containers/ community bins (stationary or haul types), from which it is collected by municipal crews, handcarts and tricycles are used for waste collection from individual houses at a specific time in the morning, when residents deposit the stored waste into the handcarts. The waste in the handcarts is either transferred to community bins or directly transferred to vehicles going to the disposal site. Few cities like Kanpur, Ahmedabad, Hyderabad, Chennai, Surat, Nashik, Panjim, Vijayawada, Vishakapattnam, Nagpur and Pondicherry has implemented house to house collection system. This collection method will be promoted as an improvement to the existing system in various cities and towns.

TRANSFER STATIONS SYSTEM

The cities like Hyderabad, Thiruvananthapuram, Surat, Vadodara, Rajkot and Panjim have established transfer stations systems. Transfer refers to the movement of waste or materials from collection points to disposal sites. Transportation of waste from collection point to disposal sites is carried out by using different types of vehicles depending on the distances to be covered by them. Larger vehicles carry the waste from the collection points to the disposal sites. Comparatively small vehicles discharge waste at transfer stations where the wastes are loaded into larger vehicles for transportation to the disposal sites. In metro cities transfer stations located at different places to support intermediate transfer of waste from the surrounding areas up to the dumping grounds. Transfer stations are centralized facilities where waste is unloaded from smaller collection vehicles and re-loaded into larger vehicles.

CHART 7: COLLECTION & TRANSPORTATION OF MSW CAN BE SCHEMATICALLY SHOWN AS



TREATMENT AND DISPOSAL

There is no processing of waste being done in most of the cities. The entire waste, which is collected, is taken for dumping to the disposal site. At present there is no sanitary landfill site in most of the cities. The disposal is carried out following the method of crude dumping where the waste is neither spread nor covered. In some

areas the garbage waste is recklessly burnt in open dump yards placed on the main highway road.

Land filling of mixed waste like non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological processing is dumped together with recyclable material. Waste processing facilities are not available with proper capacity except few cities.

WASTES PROCESSING BY ENERGY RECOVERY OR COMPOSTING

In Metro cities like Kanpur, Bangalore, Hyderabad, Ahmedabad and Kolkata, Solid Waste processing plants established near the dump site to produce Refuse Derived Fuels (RDF) plant (Energy recovery) by some of the private agencies, which involves the mechanical processing of household waste using screens, shredders and separators to recover recyclable materials and to produce a combustible product. This system involve the removal of inert and compostable materials followed by pulverization to produce a feedstock which can be incinerated in power stations, pyrolysis and gasification systems, co-incinerated in other industrial combustion processes or fluidized bed plant. In cities like Delhi, Hyderabad, Pune the vermi- composting practices has been adapted. Vermi-compost is the degraded organic matter (cast or excreta) by worm activity, and the process of converting organic fraction of the MSW into vermi-compost. The conversion of solid waste into vermi-compost is done with Low cost solution which improves the soil fertility, resulting in better agricultural yield in the region.

But plastics waste were found to be simply dumped in most of the dumpsites & forming “Hill like” structures in Dump ground, which one may call as “Plastics Hill”. On the positive note, most of these waste of Plastics Hill can be recycled provided there is an organized, scientific Framework in the form of an “Industry” which not only converts these waste into value added granules or products but also clears out the “so-called” plastics explosion in cities.

RECYCLING OF PLASTIC WASTE- TYPES & AVAILABLE OPTIONS:

The recycling of plastics is possible through different methods the polymers have become increasingly multi-component through the use of multi-layers, laminates and composites. Many polymers are rarely additive free, normally they contain additives,

formulates and modifiers such as fillers, pigments, antioxidants and flame-retardants, hence it pose difficulties in processing.

Recycling is the process of transforming materials into secondary resources for manufacturing mew products. The waste recycling leads to less utilization of raw materials, saves on landfill space, reduces the amount of energy required to manufacture new products.

The methodologies for recycling of plastics waste are classified as follows:

1. Primary Recycling (Conversion of waste plastics into products having performance level comparable to that of original products made from virgin plastics).
2. Secondary Recycling (Conversion of waste plastics into products having less demanding performance requirements than the original material).
3. Tertiary Recycling (The process for producing chemicals/fuels/ Similar Products from waste plastics).
4. Quaternary Recycling (The process for recovering energy from waste plastics by incineration).

1. Mechanical Recycling

Mechanical recycling involves processing of waste into a product which characteristics similar to those of original product. This process involves the following steps.

1. Collection and Segregation:

   The plastics materials has varying density, hence they are segregated/separated by floatation process.
2. Cleaning and Drying:

   The post consumer plastics waste requires proper cleaning and drying.
3. Sizing :

   The cleaned plastics waste products should be sized; the dried flakes are fed into an extruder where they are heated to melting state and forced through the die converting into a continuous polymer product or strands.
4. Pelletizing :

   The strands are cooled by water and cut into pellets, which produces reprocess granules.

5. Fabrication into end product :

Reprocessed granules used as raw materials for producing end products.

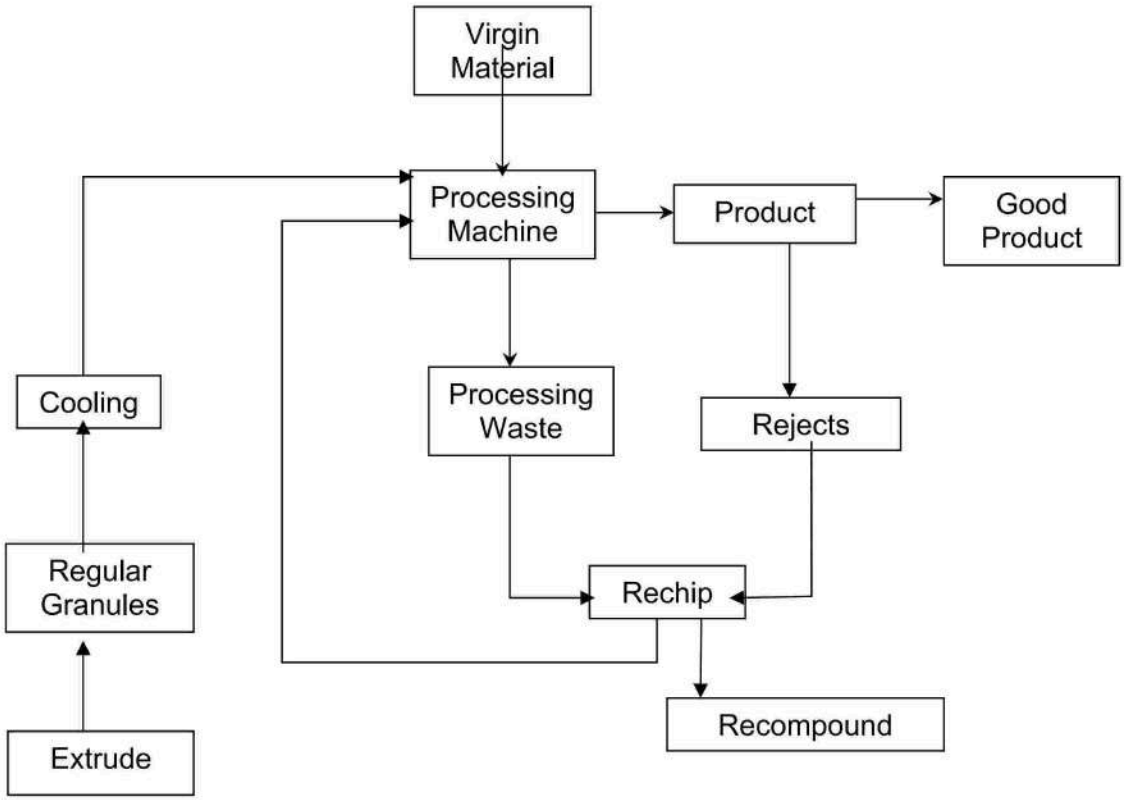


CHART 8: FLOW CHART FOR MECHANICAL RECYCLING

1. Chemical Recycling

Chemical or Feed stock recycling is a process, in which a plastic or polymer is broken down into its basic components/constituents i.e. Monomer. This process is called depolymerization. The monomers may be used as raw materials for manufacturing a new polymer. The types of Chemical recycling processes are,

Pyrolysis This technology is used for Extracting Fuel from the Non-Recyclable plastics. Pyrolysis is the chemical decomposition of condensed substances that occurs spontaneously at high enough temperatures.

Pyrolysis is a special case of thermolysis and is most commonly used for organic materials, being then one of the processes involved in charring. The pyrolysis of wood, which starts at 200-300 °C (390-570 °F), occurs for example in fires or when

vegetation comes into contact with lava in volcanic eruptions. In general, pyrolysis of organic substances produces gas and liquid products and leaves a solid residue richer in carbon content. Extreme pyrolysis, which leaves mostly carbon as the residue, is called carbonization.

Pyrolysis differs from other high-temperature processes like combustion and hydrolysis in that it does not involve reactions with oxygen, water, or any other reagents. However, the term has also been applied to the decomposition of organic material in the presence of superheated water or steam (hydrous pyrolysis), for example in the steam cracking of oil.
Anhydrous pyrolysis can also be used to produce liquid fuel similar to diesel from plastic and rubber waste.

Pyrolysis is a process of thermal degradation in the absence of oxygen. Plastic/Rubber waste is treated in a cylindrical chamber at temperature of 370 °- 420 °C. Specially developed Catalyst gently cracks the Polymer and converts plastics/ Rubber into Gas. Majority of gas gets condensed into Fuel and no condensed gas is either stored or re-used for Heating.

The essential steps in the Pyrolysis process involves:

- Elimination of Moisture by Pre-drying the material
- Indirect heating the plastic / Rubber with gradual increase in temperature.
- Converting the plastics/Rubber to gas with the help of catalytic converter.
- Careful condensation and Fractionation of pyrolysis vapours to produce fuel.

Input Material

Mixed Plastic Scrap in any form /Rigid/Film
Carry bags (even less than 20 microns) / oven sacks
Mono /Multilayer pouches and sachets
PU Foam /EPS/FRP
All kinds of Rubber Waste
Tyre scrap from Bi-cycles to Heavy Vehicles
Cable husk / Carpets / Shoe soles etc…

Output Material

Fuel Oil

Carbon Black Ash (option to convert into activated Carbon)

INPUT / OUTPUT	PLASTICS	RUBBERS
Light oil	60-65%	40-45%
Heavy oil	10-15%	10-15%
Gas	20%	20%
Ash content	5%	25%

TABLE: B PERCENTAGE OF INPUT AND OUTPUTS

Product and its application:

Furnace Oil also known as Fuel Oil or Bunker Oil. It is an industrial fuel used in generation of electricity and heat in many manufacturing units. It is majorly used in Power, Fertilizer and Steel manufacturing units in India. It is traded on major commodity exchanger

Hydrogenation:

An important method of chemical recycling is hydrolysis. The breaking down of plastics into their constituent raw materials by hydrolysis is of course, possible if the plastic contains that groups which can be hydrolyzed. Since hydrolysis is the reverse of condensation, it is clear that plastics which can be hydrolyzed are all those made by condensation. Whether hydrolysis is practical or not is solely a question for the reaction conditions.

The polycondensation products which also include plastics produced by polyaddition, encompass such as polyamides, polyesters, polycarbonates, polyureas and polyurethanes. Hydrolysis involves the specific reaction of the water molecule at the point of linkage with the starting materials (this is the reverse of the reaction that produced the polymer originally), so that the starting materials used

originally are recovered directly. The groups of plastics mentioned above as being hydrolysable are all resistant to hydrolysis under normal conditions use. Hydrolysis must be induced under extreme conditions.Moreover, hydrogenation promotes the removal of hetro atoms, such as Chlorine (Cl), Nitrogen (N), Sulphur (S) in the form of volatile compounds.

Gasification:

Gasification is a recycling method where plastics are processed into gases such as carbon monoxide (CO), Hydrogen (H2) and Hydrogen chloride. These gases are then used as the chemical raw material for the production of chemicals such as methanol and ammonia. Almost all types of plastics, including those containing chlorine can be recycled under the gasification method. However, the profitability of a gasification process largely depends on the value and application of synthesis gas. The gases can be used for synthesis of various chemicals such as methanol, ammonia or acetic acid.

3. Incineration

Incineration is the term used for the combustion and reduction to an inert residue of any combustible waste. Incineration can be used as a means of plastic waste disposal and incinerators may be used to produce steam for domestic heating and the generation of electricity. In the incinerator the combustion takes place at high temperature (around 7000°C) in the presence of the requisite amount of oxygen. Since the plastics present in waste consists mainly of carbon and hydrogen, the product obtained after combustion should consist mainly of carbon dioxide and water.

Incineration is not usually favored as a method of disposal because of very high capital, maintenance and operating costs, unreliability and adverse environmental impact. Problems are added when incineration is combined with generation of steam and the output to be controlled to suit customer demand.

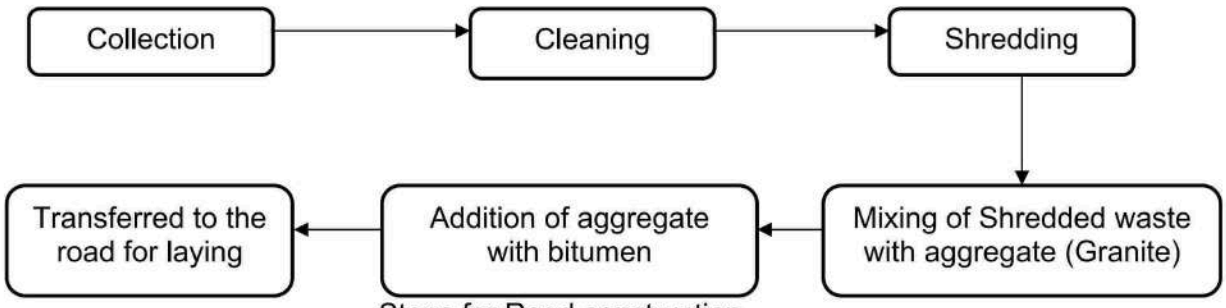
PVC has received considerable criticism since HCl gas is evolved on combustion for long term use, the incineration may be a favored and economical method to dispose of all the plastics exclusive of PVC from the incinerator to safeguard it from the

problems associated with evolution of HCl, the other plastics could be readily utilized as high energy fuel, because they have considerably high caloric value.

UTILIZATION OF PLASTICS WASTE IN DIFFERENT FIELDS

A. Road Construction

The plastic waste (Bags, Cups, Thermocloe) made out of PE, PP, & PS are separated, cleaned and shredded into small pieces by passing through 4.35mm sieve. The aggregate (granite) is heated to 170 C in the mini hot mix plant and shredded plastic waste is added, it's get softened and coated over the aggregate. Immediately the hot bitumen of 160 C is added and mixed well. As the polymer and the bitumen are in the molten state they get mixed and the blend is formed at the surface of the aggregate. The mixture is transferred to the road for laying.



Steps for Road construction

Wet Process

Blending of plastic waste by direct mixing of shredded polymer with hot bitumen at 160◦C. Mixing of higher percentage of polymer is difficult, because of difference in viscosities of molten polymer and bitumen. Powerful mechanical stirrer required for effective mixing. Also required addition of stabilizers and proper cooling

Dry Process

Waste polymer is added on the hot aggregate (170◦C).The polymer gets coated over the aggregate uniformly. The bitumen is added; mixing of bitumen with polymer takes place at the surface of the aggregate around 155-163◦C. With the increase in surface area of contact, mixing of polymer with bitumen is better. Hence, blend with better binding property is formed.

B. Cement Kilns

The recycling of plastics waste for recovery of energy is the use of plastics waste as an alternative to fusible fuel in Cement Kilns. Any material having calorific value of at least 2,500 kcals are accepted as an alternative fuel in cement kilns, provided it is available at a cost less than the normal fossil fuel: plastics waste, which have quite high calorific values, offer a viable alternative fuel. As Cement Kilns are operated at a very high temperature in the range of 1500°C or more. *Use of plastics Waste in Cement Kilns* of generation of any toxic emission due to the burning of plastics waste. In fact, Cement Kilns can be utilized for burning of some hazardous waste and for recovering precious energy out of it for production of cement. Energy Recovery depends on the types of plastics waste and the relative ease / difficulty in total or partial segregation from other plastics and / or other waste materials. Mechanical recycling includes a wide variety of processing techniques and a broad range of processing methods. Pure grade production scrap may only have to be reground and reprocessed, mixed plastics have to be mechanically separated and, if contaminated, also adequately washed and cleaned. All these steps increase the cost depending on the degree of contamination. After collection of the portions that can be recycled by mechanical recycling, there remain numerous very small, heavily contaminated articles, multi layered composites or cross-linked products, which are mostly unattended and are allowed to remain in the waste stream causing solid waste problem. The best way of reutilizing these portions is to properly incinerate them instead of dumping them diffusely on landfills. This recovers their calorific values and at the same time disposes of the waste without causing any environmental hazards. The unattended plastics waste in the Municipal solid waste stream through co-processing in Cement Kilns (Energy Recovery) using in Blast Furnaces and conversion of all types of mixed plastics waste into Industrial Fuel.

6. FINDINGS ON RECYCLABLE & NON RECYCLABLE CONTENTS:

The present study on Assessment and quantification of plastics waste generation in MSW in 60 major cities of India suggests that out of total plastics Waste, thermoplastics content is about 94% (RECYCLABLE) and rest 06% belong to family

of others including thermoset plastics (Non-Recyclable) The consolidated details of classification of different constituents of plastics waste are tabled below:

TABLE: C Consolidated PERCENTAGE OF CLASSIFIED PLASTICS WASTE

S.NO	CODES	DESCRIPTION	TOTAL PERCENTAGE OBTAINED
1	1	PET	8.66
2	2 4	HDPE/LDPE	66.91
3	3	PVC	4.14
4	5	PP	9.9
5	6	PS	4.77
6	7	OTHERS	6.43

The above data reveals that the Polyethylene Terephthalate (PET) corresponds to the identification code "1" is about 8.66% (5.69 Kg/MT), High density Polyethylene/Low density Polyethylene (HDPE/LDPE) Corresponds to the identification code "2 & 4" is about 66.91% (43.94Kg/MT), Polyvinyl Chloride (PVC) Corresponds to the identification code "3" is about 4.14% (2.72 Kg/MT), Polypropylene (PP) corresponds to the identification code "5" is about 9.90% (6.50Kg/MT), Polystyrene (PS) Corresponds to the identification code "6" is about 4.77% (3.13 Kg/MT) and other unclassified plastics/ Non-Recycling plastics/ Rubbers etc having the identification code "7" obtained about 6.43% (4.22 Kg/MT).

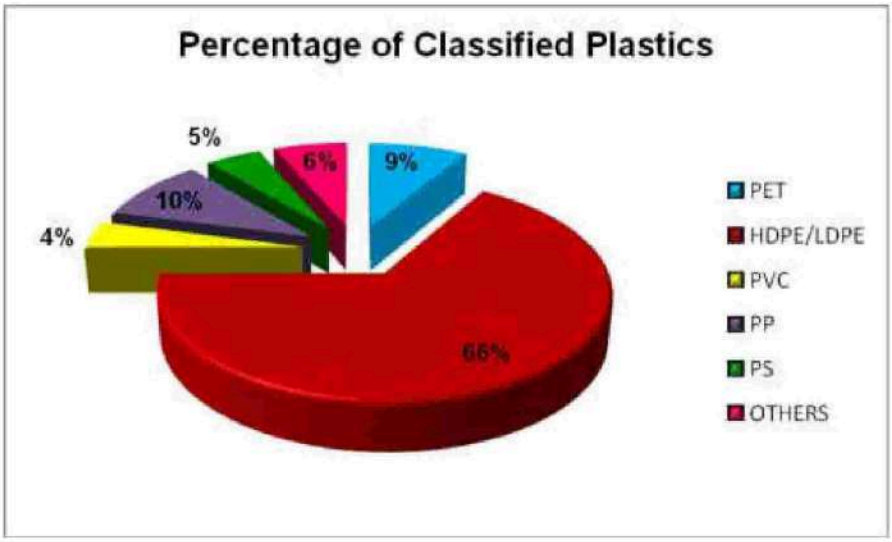


CHART 9: PERCENTAGE OF CLASSIFIED PLASTICS WASTE

The data indicates that the majority of the plastics waste (PW) obtained about 66% generated by HDPE/LPDE materials which is of mixed plastic wastes like Polybags, Multilayer pouches used for packing food items, Ghutkas etc. The households are the biggest source of plastics waste.

The mechanical recycling requires extensive sorting is necessary to separate the packaging waste and the isolation of pure plastics was found to be too difficult.

The containers, films and other oversized items which consist of Polyethylene, Polypropylene and Polystyrene can undergo mechanical recycling. But the mixed plastics, any blended material or other multilayer films should be prepared for chemical or feedstock recycling. In the chemical recycling process, contamination and heterogeneity are not a problem. The multilayer components which consists of 2-3 layers of different plastics, will find difficult on the mechanical recycling. Hence the monomer recovery makes logistics and economic sense for the multilayer pouches which are littered in more quantity and keep piling up on garbage leads unhygienic condition. It is also observed that these multilayer/ Metalized pouched are not lifted by the rag pickers, because collecting them is not profitable and non-recyclable hence thrown/dumped in the dumpsite.

7. ANALYSIS OF SAMPLES

GARBAGE SAMPLING AND ANALYSIS

The chemical and physical characteristics of garbage were analyzed for confirming the plastics waste materials. The samples were collected from the fresh MSW of dump ground analyzed by using Differential Scanning Calorimeter (DSC) make of Perkin Elmer. The samples are tested as per ASTM D: 3417, the temperature rise of 20° C/ min with the supply of nitrogen is maintained. The results obtained are depicted in (**Figure -3A, 3B, 3C, 3D, 3E)** The other plastic waste consist of thermoplastics like Poly Carbonate (PC), Poly urethane (PU), Nylon and thermosets

like Melamine formaldehyde (MF), Phenolics (PF) or (phenol formaldehydes), Urea-formaldehyde (UF) , Fibre reinforced plastics (FRP) which are not recyclable.

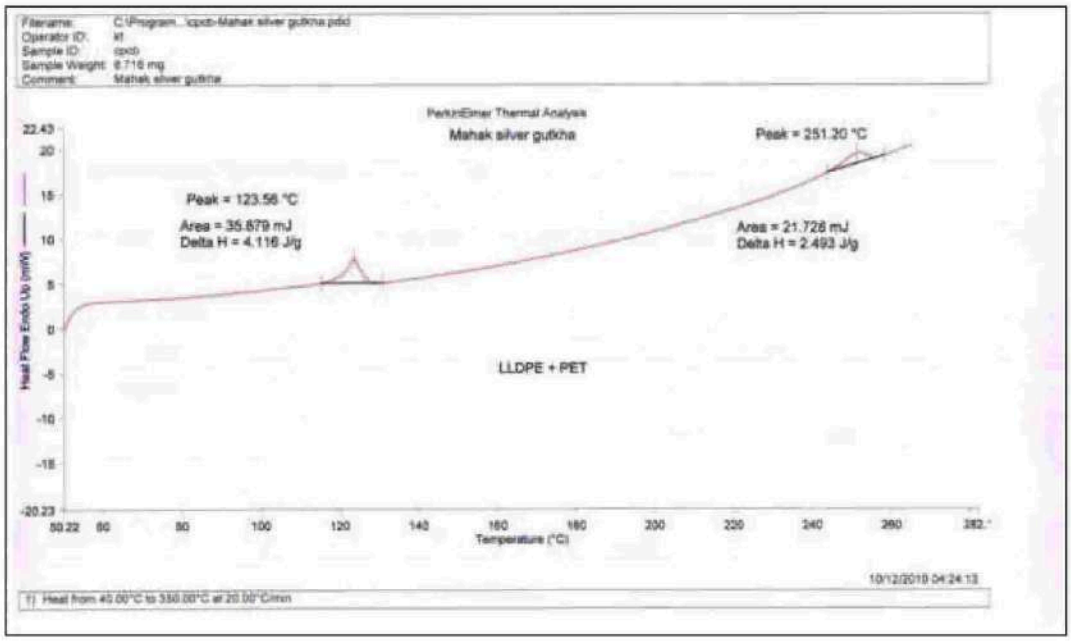


FIGURE 3A: ANALYSIS GRAPH: MAHAK SILVER GUTHKA

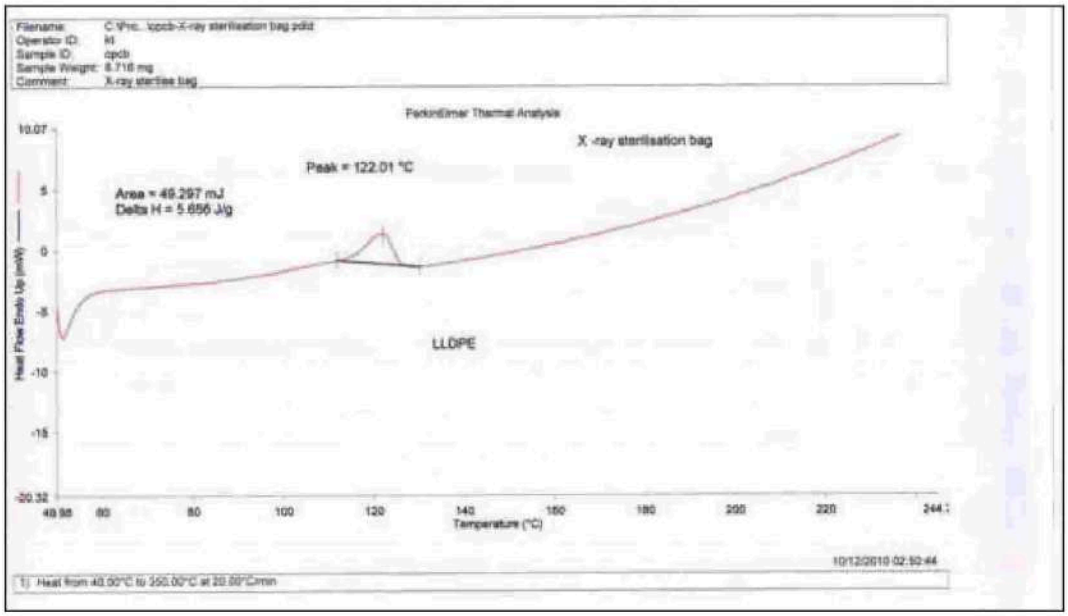


FIGURE 3B: ANALYSIS GRAPH: X-RAY STERILISATION BAG

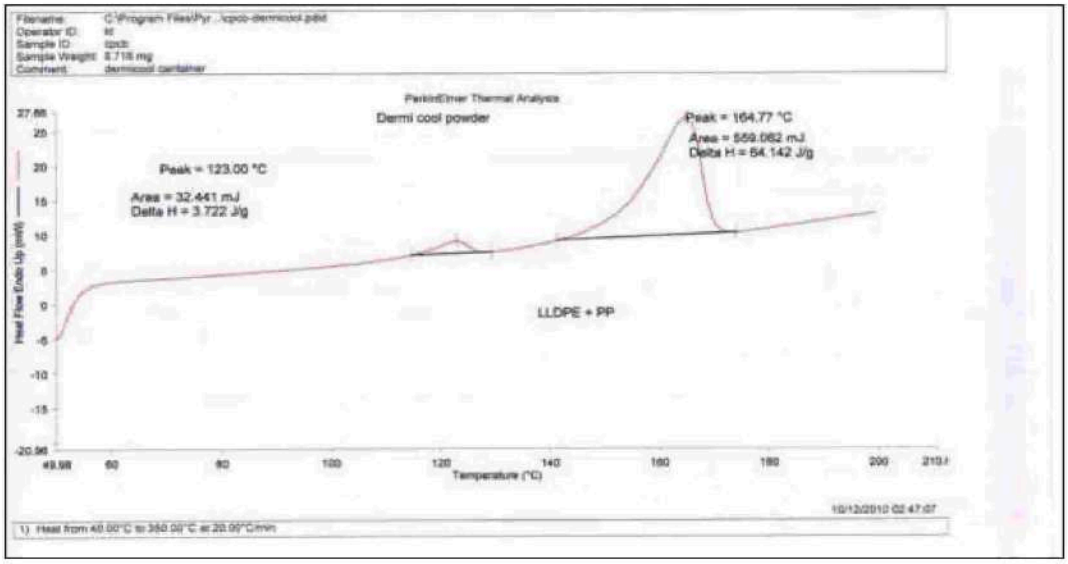


FIGURE 3C: ANALYSIS GRAPH: DERMI COOL POWDER

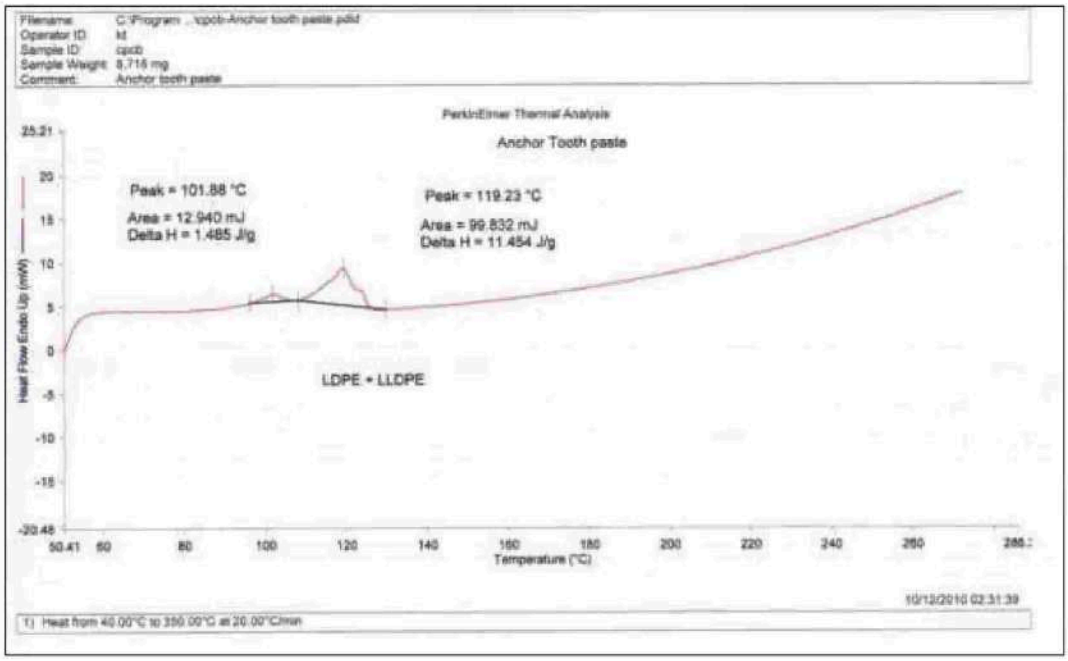


FIGURE 3D: ANALYSIS GRAPH: ANCHOR TOOTH PASTE

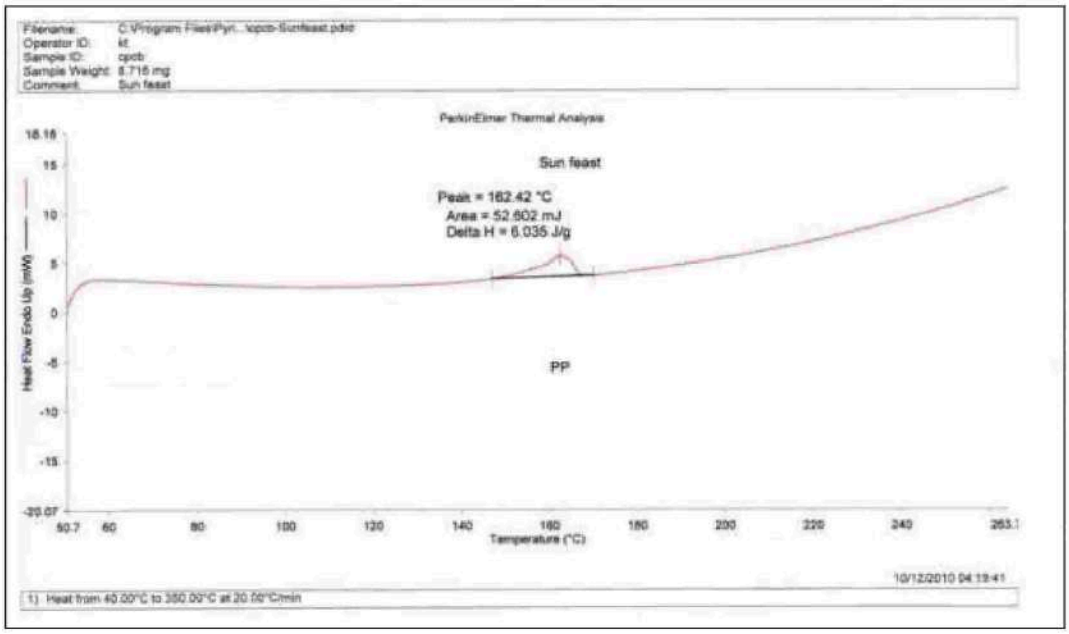


FIGURE 3E: ANALYSIS GRAPH: SUN FEAST PACK


PLASTICS WASTE ASSESSMENT AT THIRUVANANTHAPURAM


PLASTICS WASTE ASSESSMENT AT PUDUCHERRY


PLASTICS WASTE ASSESSMENT AT HYDERABAD

8. **CONCLUSION & RECOMMENDATIONS:** Based on the field study by CIPET & CPCB team at 60 cities, plastics waste (PW) content –Minimum & Maximum % during different weekdays. Also,an average value of PW content % has been worked out, taking into consideration the consolidated data of all week days of the study in different cities. The final summary of data is tabulated as follows:

S. No.	Name of City	Total Municipal Solid Waste (Tonnes per day)	Plastic Waste (Percentage of Municipal Solid Waste)	Plastic Waste (Tonnes per day)
		2010-11	2010-11	2010-11
1.	Kavaratti	2	12.09	0.24
2.	Dwarka	18	8.08	1.45
3.	Daman	25	4.64	1.16
4.	Panjim	25	4.47	1.12
5.	Gangtok	26	8.95	2.33
6.	Jamshedpur	28	3.36	0.94
7.	Silvassa	35	6.11	2.14
8.	Port Blair	45	10.07	4.53
9.	Kohima	45	5.01	2.26
10.	Shimla	50	4.45	2.23
11.	Meerut	52	6.42	3.34
12.	Gandhinagar	97	4.81	4.66
13.	Shillong	97	5.44	5.27
14.	Itanagar	102	5.35	5.46
15.	Agartala	102	5.71	5.83
16.	Aizwal	107	7.95	8.50
17.	Imphal	120	5.13	6.16
18.	Ranchi	140	5.92	8.29
19.	Kochi	150	6.29	9.43
20.	Dhanbad	150	5.02	7.52
21.	Guwahati	204	5.04	10.27
22.	Asansol	210	6.01	12.62
23.	Dehradun	220	6.67	14.66

24.	Patna	220	5.73	12.60
25.	Raipur	224	10.61	23.76
26.	Rajkot	230	6.93	15.93
27.	Thiruvanandapuram	250	6.02	15.06
28.	Pondicherry	250	10.46	26.15
29.	Chandigarh	264	3.10	8.18
30.	Jammu	300	7.23	21.68
31.	Jaipur	310	5.03	15.58
32.	Vishakhapatnam	334	9.03	30.17
33.	Nashik	350	5.82	20.38
34.	Bhopal	350	6.59	23.08
35.	Allahabad	350	5.39	18.86
36.	Jabalpur	400	5.18	20.70
37.	Bhubaneswar	400	7.98	31.92
38.	Madurai	450	5.06	22.77
39.	Varansi	450	5.76	25.92
40.	Agra	520	7.86	40.89
41.	Srinagar	550	5.12	28.14
42.	Amritsar	550	4.44	24.42
43.	Vadodara	600	4.57	27.41
44.	Vijayawada	600	7.29	43.72
45.	Nagpur	650	7.07	45.96
46.	Coimbatore	700	9.47	66.31
47.	Faridabad	700	11.29	79.03
48.	Indore	720	8.81	63.40
49.	Ludhiana	850	5.96	50.68

50.	Surat	1200	12.47	149.62
51.	Lucknow	1200	5.90	70.84
52.	Pune	1300	7.80	101.35
53.	Kanpur	1600	6.67	106.66
54.	Ahmedabad	2300	10.50	241.50
55.	Kolkata	3670	11.60	425.72
56.	Bangalore	3700	8.48	313.87
57.	Hyderabad	4200	4.75	199.33
58.	Chennai	4500	9.54	429.39
59.	Mumbai	6500	6.28	408.27
60.	Delhi	6800	10.14	689.52
	Total MSW	**50592**		
	Average PW generation		**6.92**	**4059.18**

The total MSW generated in 60 cities was about 50592 MT/Day out of which the average plastics Municipal solid waste generated was about 6.92 Kg/MT i.e. an average of about 6.92% of Plastics municipal solid waste is generated. The number of cities that ranges from 0-5%, 5-10% and more than 10% are listed in the following Table D.

TABLE D: RANGE OF PW GENERTION

SR.NO	DESCRIPTION	NO.OF CITIES
1.	0-5% PW	09
2	5-10% PW	42
3	>10% PW	09

Study team is of the opinion that 20 cities where plastics waste (PW) content is more than 7.5 %,(*Delhi, Chennai, Bangalore, Kolkata, Ahmadabad, Pune, Surat, Indore,*

Faridabad, Coimbatore, Agra, Bhubaneswar, Visakhapatnam, Rajkot, Raipur, Aizwal, Portblair, Gangtok, Kavarati, Dwarka) there is an urgent need to establish Waste recycling or treatment centre adjacent /nearby dumpsites involving Municipal Corporations & private recyclers in PPP mode.

As per the field study, it is assessed that majority of plastics waste content (about 66%) belong to HDPE/LPDE or PP materials which are of mixed plastic waste like Polybags, Multilayer pouches used for packing food items, etc. & their source is mainly from households /residential localities, Apartments etc.

The mechanical recycling of these wastes is feasible provided extensive sorting & separation, cleaning of waste are done effectively before putting into mechanical recycling by which granules/pellets can be produced. The containers, films and other oversized items which consist of Polyethylene, Polypropylene and Polystyrene can also undergo mechanical recycling in a better manner. There are few Mechanical recycling plant manufacturer in developed countries like Germany, Italy, France etc. who claim to have developed expertise in converting multilayer packaging waste into granules effectively.

It is recommended that to begin with, at least in 20 cities (mentioned above, where PW content is more than 7.5%), municipality/civic authority should take the responsibility for setting up mechanical waste recycling plant nearer to each dumpsite and engage agencies or groups working in waste management including rag pickers and ensure that open burning of plastic waste is not permitted. These 20 cities must have plastics Waste Management Cell (PWMC) to take initiative & act upon to set up Mechanical Recycling Plant.

9. Suggested Action Plan & Guidelines for Plastic Waste Management:

Plastic are non-biodegradable, synthetic polymers derived primarily from petro-fossil feedstock and made-up of long chain hydrocarbons with additives and can be moulded into finished products excluding compostable plastic or polymer confirming IS/ISO 17088:2008. These polymers are broken in presence of suitable catalyst, into monomers such as ethylene, propylene, vinyl, styrene and benzene. These monomers are then chemically polymerised into different categories of plastics.

9.1 Categories of Plastics : The main category of plastics include :

A. **Recyclable Plastics** (Thermoplastics): PET, HDLE, LDPE, PP, PVC, PS etc.

B. **Non-Recyclable Plastic** (Thermoset & others): Multilayer & Laminated plastics, PUF, Bakelite, Polycarbonate, Melamine, Nylon etc.

1) As per BIS Codification in Rule 8 (b) Plastic Waste (Management and Handling) (Amendment) Rules, 2011, there are seven categories of plastics:

S.No.	Symbol	Scientific Name	Used in
1.		Polyethylene Terephthalate	Water Bottles, PET Bottles etc.
2.		High Density Polyethylene	Milk/detergent Bags, Carry bags, Container etc.
3.		Polyvinyl Chloride	Cables, Pipes, Floorings etc.
4.		Low Density Polyethylene	Carry bags, films
5.		Polypropylene	Medicine bottles, cereal liners, Packaging films etc.
6.		Polystyrene	Foam Packaging, Tea cups, Ice cream cups etc.
7.		Others	Thermoset plastics, Multilayer & Laminated Plastics, PUF Bakelite, Polycarbonate, Melamine, Nylon etc.

9.2 Usage of Plastic and Plastic Waste:

Plastic products have become an integral part in everybody's daily life. Its production crosses the 150 million tons per year globally and in India, approximately 8 Million tonnes plastic products are consumed every year (2008). It has broad range of application in films, wrapping materials, shopping and garbage bags, fluid containers, clothing, toys, household and industrial products, and building materials. Once plastic is discarded, and remain on landscape for several years. Mostly, plastic waste are recyclable but, recycled products are more harmful to the environment as thus contains additives and colours. The recycling of a virgin plastic material can be done 2-3 times only, because after every recycling, the plastic material deteriorates due to thermal pressure and its life span is reduced. Hence recycling is not a safer and permanent solution for plastic waste disposal. It is estimated that approximately 70% of plastic packaging products are converted into plastic waste in a short span. Approximately 5.0 million tons per annum (TPA) plastic waste is generated in country, which amounts to 15342 tons per day (TPD).

9.3 Environmental issues on disposal of plastic waste :

Indiscriminate littering and unorganised recycling/reprocessing and non-biodegradability of plastic water raises the several environmental issues, it include;

- Release of fugitive emissions during polymerization process.
- Release of harmful gases such as Carbon Monoxide, Formaldehyde etc. during product manufacturing.
- Land become infertile due to indiscriminate plastic waste disposal.
- Release of toxic emissions such as Carbon Monoxide, Chlorine, Hydrochloric Acid, Dioxin, Furans, Amines, Nitrides, Styrene, Benzene, 1,3 –butadiene, CCl4 and Acetaldehyde on burning of plastics waste including polyvinyl chloride (PVC)
- Leaching of toxic metals into underground water such as Lead and Cadmium pigments due to indiscriminate dumping of plastic waste on land.
- Multilayer, metalised pouches and other thermoset plastic pose disposal problems.

- Sub-standard plastic carry bags, thin packaging films etc. pose problem in collection and recycling and reuse.
- Indiscriminate and littered plastic waste pose anaesthetic look and choke the drain.
- Soiled and mixed plastics waste interferes its beneficial utilisation.
- Unsound of plastic waste and running of recycling industries in non-conforming areas release fugitive emissions.

9.4 Technologies for Plastic Waste Management (PWM):

It has been observed that disposal of plastic waste is a serious concern due to improper collection and segregation system. However, a few technologies have been developed to minimize its adverse effect on the environment. Currently Worldwide accepted technology used for the plastic disposal in incineration, though it is not preferred option in India because it releases toxic gases like chlorinated dioxins and furans, raising several environmental issues. CPCB put efforts to consolidate innovative technical options for safer disposal of plastic waste these are described in the following paragraphs. It is worth to note that before adopting any technology, it is necessary to the description of technologies are mentioned below:

9.4.1 Utilisation of Plastic Waste in Road Construction:

(i) Description of road laying process;

The process of road laying using waste plastic is designed and the technique is being implanted successfully for the construction of flexible roads at various places in India. A brief description of the process mentioned in the **Table 1.**

Table 1: Protocol for description of road laying process

S.No.	Description	Executing Agency
1.	Collection and segregation of plastic waste (Expect chlorinated/brominated plastic waste)	Municipal Corporation, Nagar Parishad & Nagar and Gram Panchayat
2.	Transportation and storage of plastic waste	Municipal Corporation, Nagar Parishad & Nagar and Gram Panchayat
3.	Cleaning and sun drying of plastic waste	Municipal Body or PWD
4.	Shredding of plastic waste (2 to 4 MM size)	Municipal Body or PWD
5.	Heating of stone aggregate (160°c-170°c)	Municipal Body or PWD
6.	Adding of shredded plastic waste (5 to 10% w/w for 30 to 40 seconds)	Municipal Body or PWD
7.	Coated aggregate is mixed with hot bitumen (Temp. 155 °c to 163 °c)	Municipal Body or PWD
8.	The mix-plastic aggregate bitumen mix (130-140 °c) The mix can be used for road laying	

(ii) Advantages of polymer-Bitumen Roads:

- **Stripping and pothole formation**: Bitumen film is often stripped off the aggregates because of the penetration of water, which results in pothole formation. This is accelerated during the movement of vehicle. When polymer is coated over aggregate, the coating reduces its affinity for water due to non-wetting nature of the polymer and this resists the penetration of water. Hence the penetration of water is reduced which resists stripping and hence no pothole formation takes place on these roads.
- **Leaching:** Polymer will not leach out of the bitumen layer, even after laying the road using waste plastics-bitumen aggregate mix.
- **Effect of Bleeding:** Waste polymer-bitumen blend shows higher softening temperature. This increase will reduce the bleeding of bitumen during the summers.
- **Effect of Fly Ash:** Roads made from plastic-bitumen mix inhibits leaching of toxic compounds into soil.

9.4.2 Co-processing of plastic waste as Alternative Fuel and Raw Material (AFR) in cement kilns and power plants:

Co-processing refers to the use of waste materials in industry process such as cement and power stations or any other large combustion plants. Co-processing indicate substitution of primary fuel raw material by waste, recovering industry and material from waste. Waste material such as plastic waste used for co-processing are referred to as alternative fuels and raw material (AFR). Co-processing of plastic waste offers advantages for cement industry as well as for the Municipal Authorities responsible for waste management. In other hand, cement producers or power plants can save fossil fuel and raw material consumption, contributing more eco-efficient production. In addition, one of the advantage recovery method used in existing facility, eliminating the need to invest on other plastic waste practices and to secure land filling. The protocol for Co-processing of plastic waste is given at Table 2.

Table 2 : Protocol for Co-processing of plastic waste

S.No.	Item	Description	Action to be taken by
1.	Collection of plastics waste	Concerned Municipal Authority should create a system for collection of plastics waste from dustbin/Dhallaos through Public Private Partnership (PPP) mode on any other feasible method.	Municipal Corporation, Nagar Nigam, Nagar Parishad & Cantonment Boards.
2.	Segregation & Pre-processing of plastic waste	Collected plastic can be reprocessed/sorted for recyclable and non-recyclable. The Non-recyclable plastic waste will be transported to nearest cement kilns and power plant for co-processing by concerned Municipal Authority in consultation with concerned State Pollution Control Board (SPCB)/Pollution Control Board(PCC).	Municipal Corporation, Nagar Nigam, Nagar Parishad & Cantonment Boards.
3.	Identification of cement factory	Mapping of cement kilns and power plant for accepting co-processing of plastic waste in same State or neighbouring State. An agreement shall be signed between Municipal Corporations and Cement kilns.	State Pollution Control Boards & Pollution Control Committees and Municipal Bodies
4.	Modification for feeding plastic waste (PW) in cement kilns.	Cement industry/power plant to set-up storage facility, shredder, conveyor-belt, one hopper, one winch-machine and one double-flap damper.	Concerned Cement industries/power plant
5.	Setting-up of laboratory for plastics waste analysis	Cement industry/power plant shall set-up a minimum lab facility to analyses plastics waste before sending for co-processing. The instrumentation include Thermo-Gravimetric Analyser, Bomb-Calorimeter and C, H, N & S analyser.	Concerned Cement industries/power plant
6.	Monitoring of emission by cement industry/SPCBs	Cement industry/power plant shall monitor the stack emission in respect of routine parameters and hazardous air pollutants (HAPs).	Concerned Cement industries/power plant
7.	Forwarding progress Report to CPCB	Forwarding quarterly progress report of Co-processing of plastic waste to CPCB.	SPCBs/PCCs and Cement industries/power plant

9.4.3 Conversion of plastic waste into liquid RDF (oil):

Firstly, plastic waste is segregated mechanically from municipal solid waste (MSW). This method is not full-proof, as alongwith plastic waste, other lighter material is also segregated. Therefore, the segregated plastic waste is again sent through conveyer belt fixed with optical segregation device for 100% source segregation of plastic waste. Then, the mixed plastic waste is converted into the more useable i.e. Liquid RDF through catalytic pyrolysis. The process is termed random Depolymerisation as the degradation of bonds to break down into monomers occurs randomly. This process is utilized for the degradation of plastic to lower hydrocarbons. The random Depolymerisation is carried out in a specially designed Reactor, in absence of oxygen and in the presence of certain catalytic additives. The maximum reaction temperature is 350 °C. The entire feed material is converted into either of the products: Liquid RDF, gases and some sludge. There is no effluent generated in the process and the unused hot air from the reactor is released through chimney Steps involved in conversion of plastic waste into fuel RDF (Fuel) are given below :

- Mechanical segregation of plastic waste from mixed MSW dumpyard/storage;
- Transportation of Segregated plastic waste through conveyor belt for optical segregation;
- Optical segregation of plastic waste (only HD, LD, PP and multilayer packagings except PVC;
- Shredding of plastic waste and dislodging dust and impurities;
- Transportation of bsegregated (100% plastic waste) into feeding hopper (reactor);
- Feeding of plastic waste into reactor for random depolymerisation in prtesence of additives;
- Collection of liquid RDF (Fuel);
- Collection of rejects and solid waste (charcoal).
- Process flow diagram is shown at **Annexure-1**

Observations:

The quantity of plastic waste from MSW is approximately 4% and various depending on plastic waste content (quantity and concentration) in MSW sample. The catalyst added whereby the pyrolysis requires less energy and results in the formation of more branch hydrocarbons. The products of the process is reused as fuel in the process thus making the process economically viable and also help in minimising air pollution. The Oil (liquid RDF) has properties similar to LDO and can be safely used as an alternative to LDO in industries the conserving the already depleting natural resources. The by-products from the process like sludge and gas can be reused. The sludge can be reused as fuel in cement industries while the gas reused in the system as a fuel.

9.4.4 Plasma Pyrolysis Technology (PPT)

Plasma Pyrolysis is a state of the art technology, which integrates the thermo-chemical properties of plasma with the pyrolysis process. The intense and versatile heat generation capabilities of Plasma Pyrolysis Technology enable it to dispose of all types of plastic waste including polymeric, biomedical and hazardous waste in a safe and reliable manner. Pyrolysis is the thermal disintegration of carbonaceous material in oxygen-starved atmosphere. When optimized, the most likely compounds formed are methane, carbon monoxide, hydrogen carbon dioxide and water molecules. In plasma pyrolysis, firstly the plastics waste is fed into the primary chamber at 850 °C through a feeder. The waste material dissociates into carbon monoxide, hydrogen, methane, higher hydrocarbon etc. Induced draft fan drains the pyrolysis gases as well as plastics waste into the secondary chamber where these gases are combusted in the presence of excess air. The inflammable gases are ignited with high voltage spark. The secondary chamber temperature is maintained at 1050 °C. The hydrocarbon, CO and hydrogen are combusted into safe carbon dioxide and water. The process conditions are maintained such that it eliminates the possibility of formation of toxic dioxins and furans molecules (in case of chlorinated waste). The conversion of organic waste into non-toxic gases (CO_2, H_2O) is more than 99%. The extreme conditions of plasma kill stable bacteria such as bacillus stereo-thermophilus and bacillus subtilis immediately. Segregation of the waste is

not necessary, as the very high temperature ensure treatment of all types of waste without discrimination.

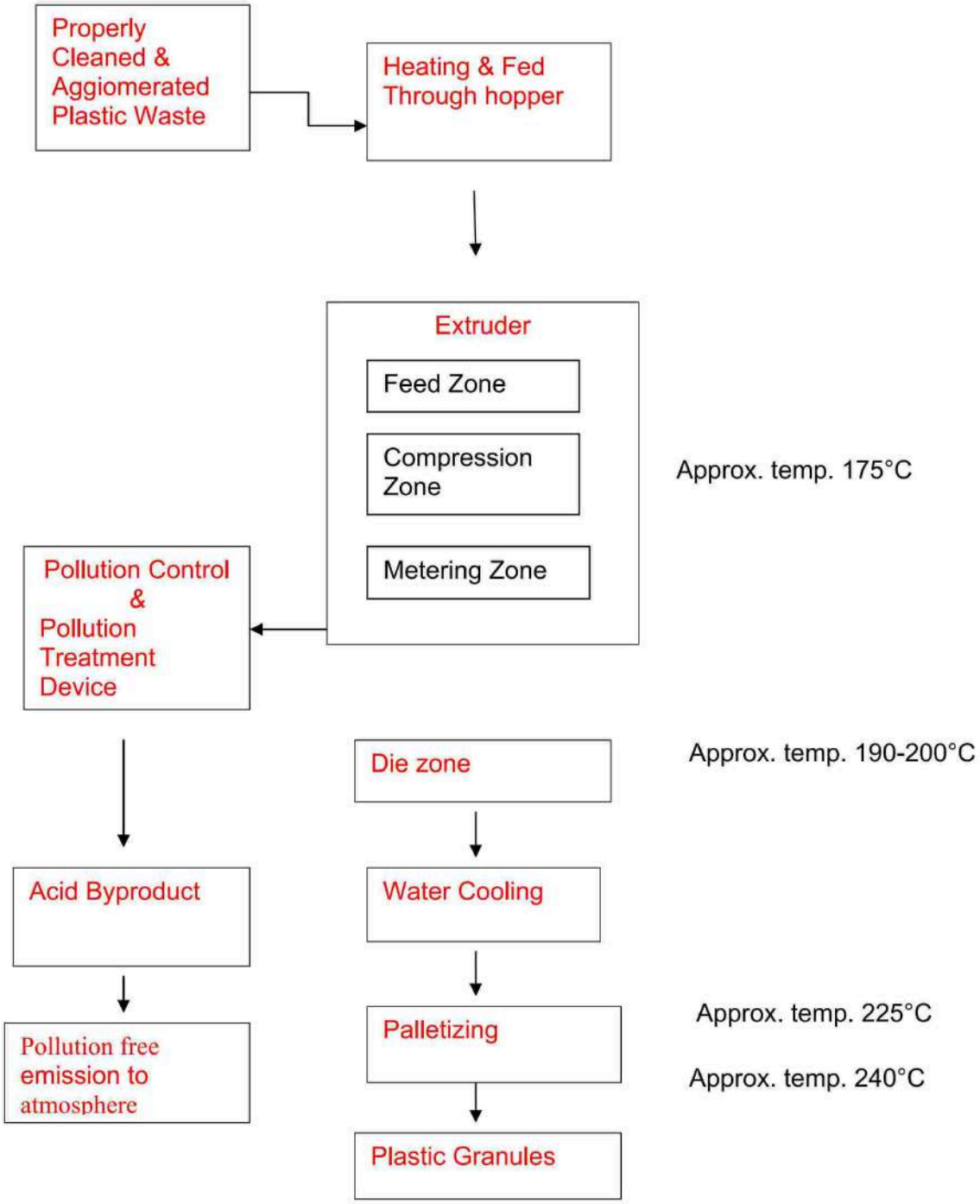
Environment Related Observations

Stack emission monitoring of different categories plastic waste such as 100% Polyethylene Waste 80% polyethylene + 20% PVC waste was carried out by VIMTA Lab. It has been observed that the emission of toxic pollutants such as dioxins and furans from the plasma pyrolysis system developed by FCIPT is lower than the norms set for incinerator.

9.4.5 Recycling of plastic through environmentally sound manner:

The main goal for developing green recycling of waste plastic was to design an extruder, which would have "Zero Significant Adverse Environmental Impact ". This has been achieved by assigning right motor of minimum capacity, selecting optimum L/D ratio, heat sealing and right temperature for the processes and trapping all the emission in pollution control gadget and treating the pollutant to produce byproducts. The extrusion & palletisation processes have been redesigned to make the pollution from the process to a minimum level and as a result to enhance the efficiency of the process. The details of process Flow Chart is given below:

Process Flow-chart of the "Green Recycling Process" – The Pilot Plant



3.0 Action Plan for PWM:

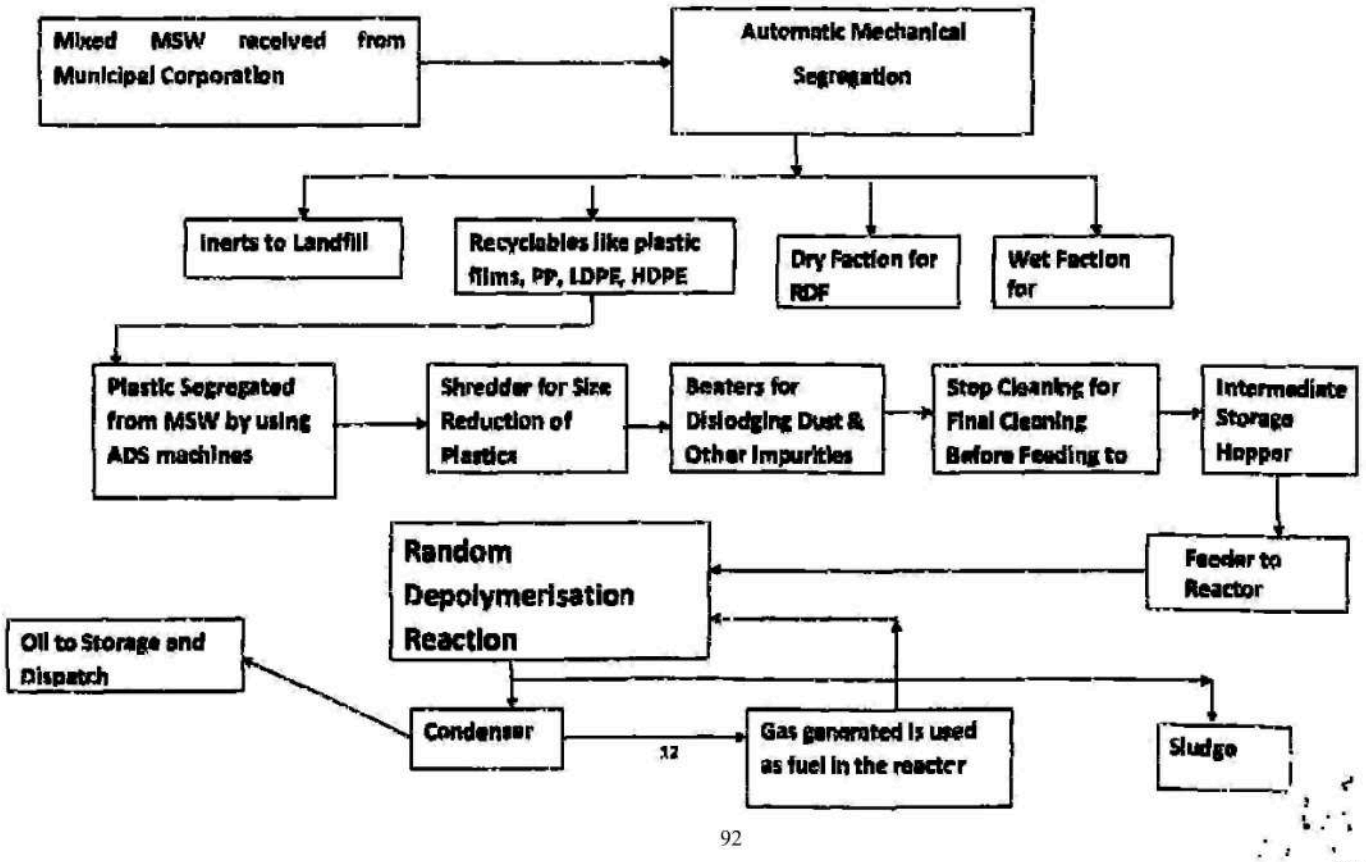
A time-bound action points as per the provisions of Rule 6 of Plastic Waste (Management & Handling) (Amendment) Rules, 2011 is mentioned at table: 3 below:-

Table 3 : Time Bound Action Plan for PWM

S. No.	Action Points	Time Required	Infrastructure Requirement	Implementing Authority
1.	Setting-up of plastic waste system such as Safe, collection, storage, segregation	Within 6 months	Establishment of separate bin	Concerned Municipal Authority such as Municipal Cooperation, Municipal Council, Nagar or Gram Panchayat.
2.	Safe, collection, storage, segregation	Immediate	Segregation of plastic waste from Municipal Solid Waste (MSW)	Concerned Municipal Authority such as Municipal Cooperation, Municipal Council, Nagar or Gram Panchayat
3.	Transportation, processing and disposal of plastic waste	Immediate	Transportation of segregated plastic waste to disposal site	Concerned Municipal Authority such as Municipal Cooperation, Municipal Council, Nagar or Gram Panchayat
4.	Create awareness among all stakeholders about their responsibilities including house holders or owners or occupiers	Within 6 months	• Mobile vans • Newspapers ads • Television • FM Radio	Concerned Municipal Authority such as Municipal Cooperation, Municipal Council, Nagar or Gram Panchayat
5.	Engage agencies or groups working in waste management	Within one year	Visiting to successful waste management sites such as Kanpur, Gwalior, Surat, Rajkot etc.	Concerned Municipal Authority such as Municipal Cooperation, Municipal Council, Nagar or Gram Panchayat
6.	Ensure that open burning of plastic waste is not permitted	Immediate	Constitution of Vigilance Squad	Concerned Municipal Authority such as Municipal Cooperation, Municipal Council, Nagar or Gram Panchayat

Annexure -I

Process flow diagram for production of Liquid RDF from waste plastic



Annexure- II A

Signed Declaration Form by ULB for Swach Vayu Sarvekshan 2024

1.	Measures to abate emissions from biomass/ municipal solid waste burning	
		Value
Component 1a	% of solid waste collected against generated	
a.	Total Solid Waste generated (Tonnes/day)	2000
b.	Total Solid waste collected (tonnes/day)	2000
c.	% of solid waste collected against generated (%)	100 %
d.	Marks self-assigned as per guidance document (unit)	10
Component 1b	% of solid waste processed against generated	
a.	Total Solid Waste generated (Tonnes/day)	2000
b.	Total Solid waste processed (tonnes/day)	1635
c.	% of solid waste processed against generated (%)	81.75%
d.	Marks self-assigned as per guidance document (unit)	10
Component 1c	% of Installed capacity to process the generated waste against required to process 100% waste generated	
a.	Installed Capacity to process the generated waste (Tonnes/day)	1635
b.	Capacity required to process the 100% waste generated (Tonnes/day)	2000
c.	% of Installed capacity to process the generated waste against required to process 100% waste generated	81.75%
d.	Marks self-assigned as per guidance document (unit)	5
Component 1d	% of legacy waste processed against existing total legacy waste	
a.	Total Legacy Waste existing (Tonnes)	2600000
b.	Total Legacy waste processed (tonnes)	2106577
c.	% of legacy waste processed against existing (%)	81.02%
d.	Marks self-assigned as per guidance document (unit)	5
Component 1e	Ban imposed on burning of solid waste	
a.	No. of complaints of waste burning in PGRS in the entire year	0
pb.	Marks self-assigned as per guidance document (unit)	5
Component 1f	% of plastic waste collected against generated	
a.	Total Plastic Waste generated (Tonnes/day)	99
b.	Total Plastic waste collected (tonnes/day)	86
c.	% of Plastic waste collected against generated (%)	86.99%
d.	Marks self-assigned as per guidance document (unit)	5

Signature	
Name	Sanjeev Pradhan
Designation	Environmental Engineer

पर्यावरण अभियन्ता
नगर निगम, लखनऊ

Annexure-II B

उत्तर प्रदेश प्रदूषण नियंत्रण बोर्ड
UTTAR PRADESH POLLUTION CONTROL BOARD

Ref. No: 112969 /Plastic Annual-222/2024 Dated: 25-6-24

सेवा में,
समस्त क्षेत्रीय अधिकारी,
उत्तर प्रदेश प्रदूषण नियंत्रण बोर्ड,
उत्तर प्रदेश।

विषयः **SDG 92 DIF इंडीकेटर्स Plastic Waste generated per 1,000 population (Tonnes/Annum) में उत्तरोतर सुधार हेतु जनपदवार रिवाइज्ड डाटा वर्ष 2023–24 के सम्बन्ध में।**

महोदय,

कृपया उपरोक्त विषयक का संदर्भ ग्रहण करने का कष्ट करें। उक्त के माध्यम से अवगत कराना है कि Indicator Plastic Waste generated per 1,000 population (Tonnes/Annum) के सम्बन्ध में सूचना सॉलिड वेस्ट के वार्षिक रिपोर्ट वर्ष–2022–23 के आधार पर संकलित कर सचिव, नियोजन विभाग, उ0प्र0 शासन को उपलब्ध कराया गया है जिसकी सूची पत्र के साथ संलग्न है।

अतः यह पत्र इस आशय से प्रेषित है कि जनित प्लास्टिक वेस्ट के सम्बन्ध में किसी भी स्तर के पत्राचार में प्रस्तुत किये गये आकड़ो में भिन्नता न हो इसलिए समस्त क्षेत्रीय अधिकारी अपने क्षेत्रीय कार्यालयों के अन्तर्गत आच्छादित जनपदों के विभिन्न निकायों से Plastic Waste generated per 1,000 population (Tonnes/Annum) के सम्बन्ध में सूचना प्राप्त कर सूची को अपडेट करना चाहे तथा संशोधित आकड़ो से बोर्ड मुख्यालय को भी अवगत करायें अथवा सूची में वर्णित मात्रा से सहमत होने की दशा में भी डब्ल्यू0एम0डी0 को तद्नुसार सूचित करने का कष्ट करें।

संलग्नकः–यथोपरि।

भवदीय

Atulesh yadav
(अतुलेश यादव)
मुख्य पर्यावरण अधिकारी,
(डब्ल्यू0एम0डी0)

T.C. 12V, Vibhuti Khand
Gomti Nagar, Lucknow – 226010
Phone: 2720831, 2720828, 2720691 & 2720681
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SDG 92 Goal 12 DIF Indicator- Plastic Waste generated per 1000 population(Tonnes/Annum) (Year :- 2023-24)		
S.no.	District	Total Plastic Waste Generated (In TPA) per 1000 Population (Approx.)
1	Agra	4.804
2	Aligarh	3.462
3	Ambedkar Nagar	0.897
4	Amethi	0.220
5	Amroha	2.186
6	Auraiya	0.806
7	Ayodhya	1.313
8	Azamgarh	0.419
9	Badaun	1.028
10	Bagpat	1.469
11	Bahraich	0.834
12	Ballia	0.485
13	Balrampur	0.620
14	Banda	0.899
15	Barabanki	0.508
16	Bareilly	2.475
17	Basti	0.776
18	Bhadohi	0.597
19	Bijnor	1.726
20	Bulandsahar	1.598
21	Chandauli	0.725
22	Chitrakoot	0.572
23	Deoria	0.823
24	Etah	0.737
25	Etawah	1.335
26	Farrukhabad	0.900
27	Fatehpur	1.089
28	Firozabad	3.505
29	Gautam Buddh Nagar	0.638
30	Ghaziabad	7.279
31	Ghazipur	0.503
32	Gonda	0.425
33	Gorakhpur	5.433
34	Hamirpur	0.909
35	Hapur	2.230

JRF

36	Hardoi	0.863
37	Hathras	0.867
38	Jalaun	1.861
39	Jaunpur	0.567
40	Jhansi	3.418
41	Kannauj	1.006
42	Kanpur	5.292
43	Kanpur Dehat	0.619
44	Kasganj	0.841
45	Kaushambi	0.709
46	Kheeri	0.888
47	Kushinagar	0.747
48	Lalitpur	0.743
49	Lucknow	4.699
50	Maharajganj	0.808
51	Mahoba	1.671
52	Mainpuri	0.650
53	Mathura	2.057
54	Mau	1.098
55	Meerut	5.111
56	Mirzapur	0.762
57	Moradabad	1.758
58	Muzaffarnagar	1.528
59	Pilibhit	1.282
60	Pratapgarh	0.991
61	Prayagraj	1.730
62	Raebareilly	0.519
63	Rampur	1.840
64	Saharanpur	3.089
65	Sambhal	2.240
66	Sant Kabeer Nagar	0.658
67	Shahjahanpur	1.256
68	Shamli	2.360
69	Siddharth Nagar	0.556
70	Sitapur	0.789
71	Sonbhadra	0.875
72	Sravasti	0.383
73	Sultanpur	0.397
74	Unnao	0.896
75	Varanasi	4.628
TOTAL		**117.274**

JRA
15/7/26

Annexure- III

Impact of Plastic Waste Disposal on Soil and Water Quality at Lucknow Dumpsites

CENTRAL POLLUTION CONTROL BOARD
(Ministry of Environment & Forests)
Parivesh Bhawan, East Arjun Nagar,
Delhi-110032

December, 2015

अरूण कुमार मेहता, भा.प्र.से.
संयुक्त सचिव
(पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय)
ARUN KUMAR MEHTA, I.A.S.
Joint Secretary
(Ministry of Environment, Forest & Climate Change)
&
अध्यक्ष
केन्द्रीय प्रदूषण नियंत्रण बोर्ड
Chairman
CENTRAL POLLUTION CONTROL BOARD

भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
नई दिल्ली - 110003
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST &
CLIMATE CHANGE
NEW DELHI-110003

FOREWORD

The soil and groundwater has been contaminated due to indiscriminate littering and dumping of various wastes including plastic waste. The existing MSW landfill sites are mostly filled with different categories of plastic waste which persist in nature for several years specially due to its non-biodegradability. Plastic waste dumping on land causes several environmental issues like imparting infertility in soil, releasing toxic gases on burning, causing death on eating by cattle and most importantly, the additives and colours used during manufacturing processes have potential of leaching out heavy metals and other chemical compounds that may contaminate soil & ground-water quality. To study the effect of municipal and plastic waste dumping on soil and underground water, CPCB sponsored a project to Indian Institute of Toxicological Research (IITR), Lucknow to study "Impact of Plastic Waste Disposal on Soil and Water Quality at Lucknow Dumpsites". The soil and water quality data revealed that the heavy metals, chloride, phthalates etc. migrate from plastic waste into the surrounding medium because these are not chemically bound and remain present as mobile and leachable phase. The leachate can cause considerable pollution problems by contaminating the surrounding soil, ground or surface water.

I hope this report would be useful to the urban local bodies, State Pollution Control Boards and other agencies to understand the environmental issue due to improper dumping of MSW including Plastic waste. I would like to thank officials of IITR, Lucknow for completing the study. I would also like to appreciate sincere efforts made by Dr. S.K. Nigam, Additional Director, CPCB, Delhi for overall co-ordination of the study and Scientists of Zonal Office, Lucknow in assisting the field studies.

(A.K. MEHTA)
Chairman

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Contents

Executive Summary

Solid waste management (SWM) is an integral part of the urban environment and planning of the urban infrastructure to ensure safe and healthy environment. While considering the promotion of sustainable economic growth, the rapid and unplanned industrialization, urbanization and population growth have resulted in proliferation of consumer articles vis a vis generation of waste.

Lucknow city is situated at the banks of river Gomti. Geographically, Lucknow city is situated at coordinates 26.85°N and 80.92°E having 2,528 km^2 area. As per 2001 census its population was approximately 27.50 lakhs generating more than 1200 tonnes per day of municipal solid waste. The purpose of the study was to assess the impact of plastic waste disposal on soil and ground water quality of Lucknow dumpsite. The following two dumpsite locations of Lucknow city: a) Ghaila, Hardoi Road and b) Dudauli, Sitapur Road have been under taken for the sampling and study.

Samples of soil and water were collected and analyzed in both pre monsoon and post monsoon seasons. It was found through the determination of Toxicity Characteristic Leaching Procedure (TCLP) that chemical moieties like heavy metals, chloride, phthalates etc. migrate from plastic waste to the surrounding medium. Since these plastic additives are not chemically bound with the polymeric chain and remain present as free and leachable phase, hence, they can migrate from plastic to the recipient medium during landfilled conditions due to physico-chemical exertion and microbial degradation. These leachates can cause considerable pollution problems by contaminating the surrounding soil, ground or surface waters.

1. Introduction

Plastics are petro-based polymer made-up of long chain of hydrocarbons and non-biodegradable. Plastics are widely used for storage and packaging of food stuffs and transportation. The usage includes disposable and reusable containers, plastic wraps, cutlery, water bottles and baby bottles. Plastic products can be easily found in human residential and occupational environments in high concentrations. After their service life, the plastic products may be landfilled where due to biotic and abiotic degradation, leaching of plastic additives i.e. heavy metals, plasticizers, stabilizers, unreacted monomers and harmful moieties of colorants occur which ultimately percolate in different segments of environment contaminates soil and water bodies.)

The toxicological effects of several plastic additives have been sporadically studied and there is a need for holistic study on impact of plastics waste disposal on soil and ground water. The aim of this study is to monitor and assess the impact of polymeric and plastic additives with special reference to heavy metals and phthalate esters on soil and water medium as they are landfilled along with municipal solid waste. An effect has been made to understand the toxicological implications due to leaching of plastic waste and to generate baseline data to draw recommendations for identifying the health risk due to the presence of heavy metals and phthalate esters migrating food chain through various polymeric and plastic additives used by plastic products manufacturing industries.

2. AIMS & OBJECTIVES

- To collect the soil and water samples from two identified dumpsite locations of Lucknow city (i.e. Dudauli and Ghaila sites) and compile the information regarding the commonly used practice for plastic waste disposal by municipal authorities and Consumers.
- To estimate the migration or leaching of heavy metals (Cd, Co, Cr, Cu, Pb, Mo, Ti and Zn) and phthalate esters in ground water and soil samples collected from landfill sites.

3. SCOPE OF THE STUDY

- To collect and identify different types of plastic products and waste from market and dumpsites such as colored plastic bags and containers and gift items, plastic crockery and multilayered plastic and find out leachability of plastic products and waste in laboratory through appropriate testing methods.
- To collect water and soil samples near the dumpsites at Lucknow.
- To **study the migrations of phthalate esters from dump sites.**
- To suggest remedial measures on use of additives in production of plastic products.

4. PLAN OF WORK

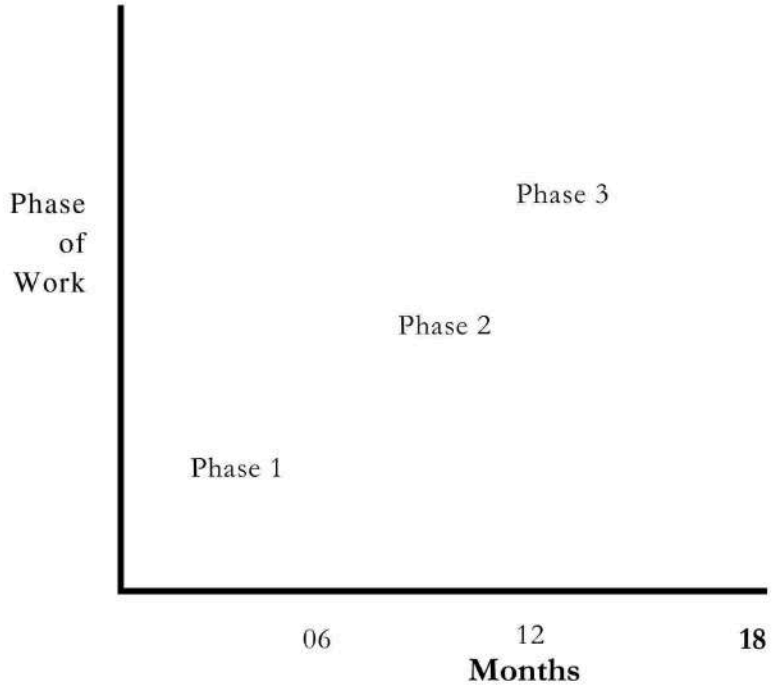


Table-1: Work Plan

Phases	Proposed Plan	Status
Phase 1:	Initiation of sample collection, procurement of chemicals and glassware, processing, preparation of reagents, standardization of method and appointment of staff.	• Control samples of and water had been analyzed during November, 08-January, 09. • Procurement of chemicals and glass wares, processing, preparation of reagents, standardization of method had been completed. • Project staff as envisaged in the project had been appointed. • Pre-monsoon sampling from Dudauli dumpsite was completed.
Phase 2:	Estimation of plastic additives viz. heavy metals and phthalates using standard procedure.	Analysis of pre-monsoon samples was done
Phase 3:	Continued the analysis of phthalates, metals etc, and interpretation of available data and compilation of report.	Post-monsoon sampling from Dudauli dumpsite was completed on September 28-30, 2009 and sampling on Ghaila dumpsite was completed on December 9-10, 2009.

5. METHODOLOGY

5.1 Sampling

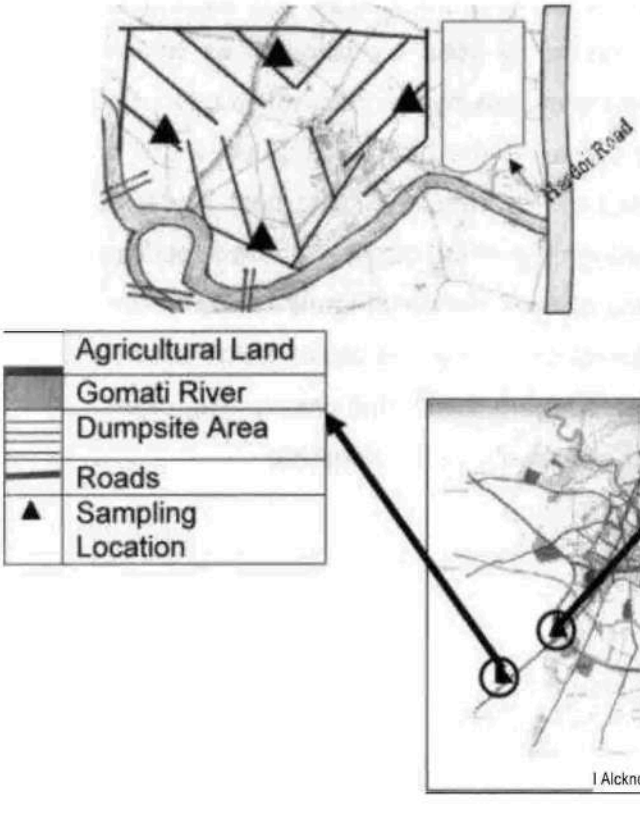
5.1.1 Identification of Sampling Location:

On the basis of field survey and data concerning to municipal and plastic waste dumping provided by Lucknow Nagar Nigem, relating to two dumpsite location i.e. (a) Ghaila, Hardoi Road and (b) Dudauli, Sitapur Road have been under taken for digging borewell of 30 meter deep at each locations. The samples were taken for soil and water quality testing using Standard Methods. Samples were taken at two locations on Ghaila dumpsite and four locations on Dudauli dumpsite in pre and post monsoon period. From each location respective siol samples were collected at the surface and further at regular intervals of 3 metes upto the depth of the constructed well. After construction of well first static water samples were drawn in triplicate at each location. Summary of the sample collection is presented in **Table 2.**

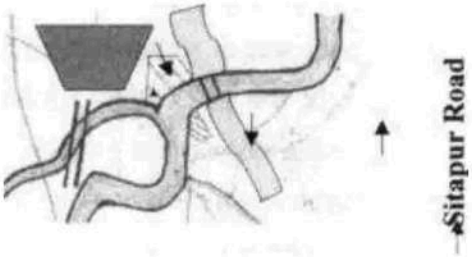
Table - 2

S. No.	Sample Site	No. of Samples			
		Pre-Monsoon Plan for Sampling		Post-Monsoon Plan for Sampling	
		Water	Soil	Water	Soil
1.	Municipal Solid Waste Dumpsite, **Ghaila,** Hardoi Road, Lucknow (2 **locations, 3 each)**	06	06	06	06
2.	Municipal Solid Waste Dumpsite, **Dudauli,** Sitapur Road, Lucknow (4 locations, 3 each)	12	12	12	12
	Total (72 Samples)	18	18	18	18
Total No. of construction of 30 meter deep test wells: 06 **Total No. of samples involving lysimetric method:** Water (36 samples) and Soil (36 samples)					

Ghaila Municipal Solid Waste Dumpsite, Hardoi Road, Lucknow



Dudauli Municipal Solid Waste Dumpsite, Sitapur Road, Lucknow



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5.1.2. Sampling Procedure:

Sampling was carried out through direct circulation system rotary (Mud Rotary Drilling) method using DC mini rig (suitable capacity 300 mm diameter and 120 meter depth in alluvial soil). This method and system includes a drill bit, a drill string having drill rods, and a rotary table or power swivel for bringing the drill bit into rotation by means of the rods. Mud rotary drilling is a commonly used for alluvium as well as overburden but cannot be used in situations where excess hydrostatic heads cannot be tolerated such as in some earth embankment dams. As the name describes, a drill bit on the bottom of a string of drill rods is rotated in a borehole. Drilling fluid (water) is circulated in the borehole by pumping down through the string of rods, where it picks up the drill cuttings and carries them to the surface of the borehole (Figure 1). The proper drilling fluid is essential for the proper installation of drilling rig. For most instrumentation installations the sides of the borehole should be supported with drill casing. The casing also prevents the drilling fluid from contacting the sidewalls of the borehole.

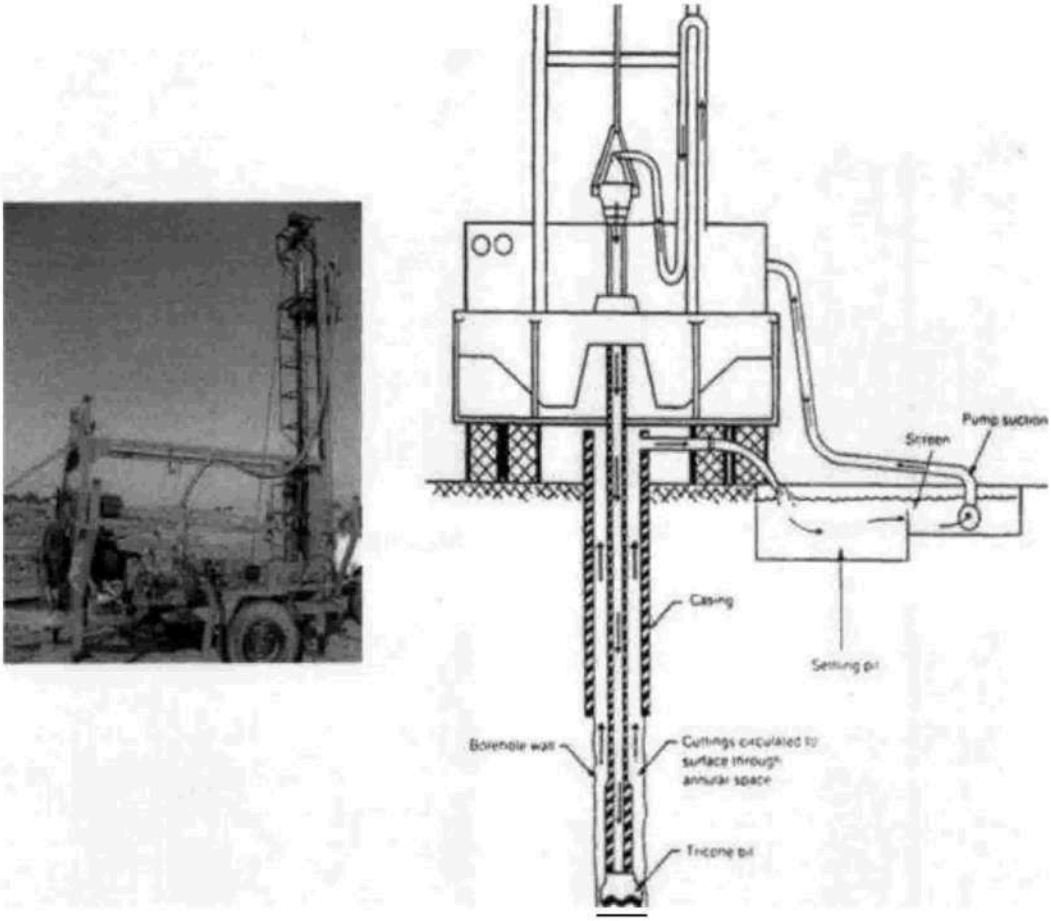
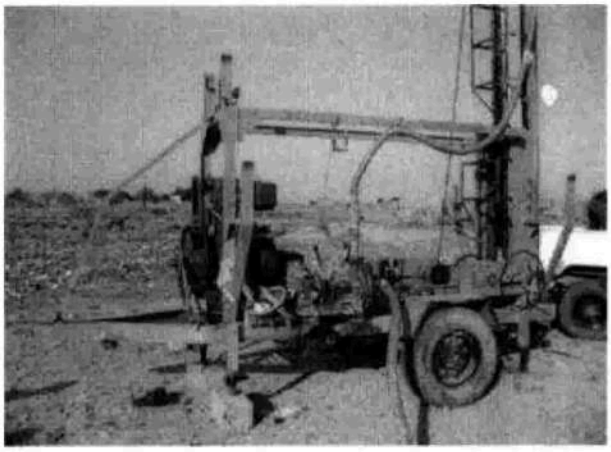


Fig 1: Direct Circulation System Rotary (Mud Rotary Drilling) method using DC mini rig

5.1.3. Step of Sampling:

Step i): Identified sampling location



Step ii): Installation of DC mini rig for drilling bottles

Step iii): Mode of drilling using Direct Circulation System Rotary (Mud Rotary Drilling) method

Step iv): Formation of recycled water micro well

Step v: Soil sample collection in cloth bag

Step vi: Drawing water samples by installation of submersible pump in constructed well

Step vii): Collection of water samples in glass bottles

Step viii): Sealing of construction well using concrete cement material

5.1.4. Preservation of Samples:

Soil samples were collected in cloth bag and glass bottles. Samples of water collected in 2 litre glass bottles and LDPE containers as per USEPA guidelines for waste and solid waste: SW 846. All samples were preserved at refrigerated conditions. During sampling and processing of the samples, precautions were taken to avoid external contamination. This is important since phthalates are ubiquitous chemicals in the indoor

environment. Therefore, use of plasticized plastic equipments were avoided during sampling and processing. For phthalate analysis, all glassware's were properly cleaned with Dichloromethane (DCM/HPLC grade) before use. Detergents were not used during washing of glassware's and all equipments were preconditioned and checked for blank levels of phthalates before analysis. The sample for analysis of heavy metals were preserved by adding 5 ml Nitric acid per liter of water sample.

5.2 ANALYSIS

Parameters of soil and water samples collected and analysed are given below **Table-3** :

S.No.	Sample	Parameters
i)	**Soil**	pH, Heavy metals (Cd, Co, Cr, Cu, Pb, Mo, Ti and Zn), Nitrogen, Phosphorous, Potassium, Phthalates.
ii)	**Water**	Heavy metals (Cd, Co, Cr, Cu, Pb, Mo, Ti and Zn) and Phthalates.
iii)	**Leachates**	TCLP for heavy metals (Cd, Co, Cr, Cu, Pb, Mo, Ti and Zn), *Carbon Black,* Nigrosine Dye, Chlorides, Phthalates.

5.2.1. Determination of Hazardous Characteristics of Wastes: Toxicity Characteristic Leaching Procedure (TCLP)

This method is based on USEPA Method 1311-Toxicity Characteristics Leaching Procedure (TCLP). This is applicable to the determination of mobility of metals and semi-volatile organic compound in solids. The principle involved in leaching procedure consists of 3 main steps:

Step I- Crushing/grinding: The solid sample has been passed through 9.5-mm sieve.

Step II- Determination of appropriate extraction fluid: Depending on the pH of the solid sample, one of two extraction fluids is used to extract the soil.

Step III- Extraction of solid sample: The solid sample is extracted (20:1 liquid to solid ratio) by shaking it end over end for 18 ± 2 hours at a controlled temperature at 30 rpm. The extract also known as the leachate is then filtered and analyzed for desired analytes. The moisture content of the solid sample is determined separately and reported alongwith the analytical results.

Preparation of Extraction Fluid No.1:

- 5.7 ml of glacial acetic acid added to 500 ml of double distilled water.
- Then 64.3 ml of 1 M NaOH added to above solution and diluted to 1 liter.
- The pH of this fluid maintained at 4.93 0.05.

Preparation of Extraction Fluid No.2:

- 5.7 ml of glacial acetic acid diluted to 1 liter.
- The pH of this fluid maintained 2.88 ± 0.05.

Note: The extraction fluids should be monitored frequently for impurities and the pH concentration and it may be discarded, if impurities found or pH is not within specifications.

Determination of Appropriate Extraction Fluid:

- 5.0 g (± 0.1 g) of the sample (<9.5 mm) transferred into a 500 ml beaker or Erlenmeyer flask. 96.5 ml of DDW added to the beaker and covered with a watch glass. It then stirred vigorously for 5 minutes using a magnetic stirrer.
- The pH solution measured and recorded.
- When the pH 5.0, extraction fluid No.1 used.
- When the pH > 5.0, added 3.5 ml 1 M HCl, covered with a watch glass, heated to 50°C±2 for 10 minutes. Solution allowed to cool at room temperature and then pH recorded. When the pH was 5, use extraction fluid No.1. Otherwise, use Extraction fluid No.2

Analysis of leachate:

The leachates have been prepared and analyzed as per standard guidelines.

5.2.2. Estimation of Heavy Metals:

200 ml of water sample or the TCLP extract of soil/plastic material were taken in conical flask, digested it for organic substances, if any, with 20 ml concentrated nitric acid in a fuming chamber. The digested samples were made upto 20 ml with 0.1 N HNO_3 and analyzed for Cd, Co, Cr, Cu, Pb, Mo, Ti and Zn with the help of Atomic Absorption Spectrophotometer (ZEEnit- 700) under following conditions are mentioned at **Table-4.**

Table:- 4

S. No	Metals	Lamp current (m A)	Wave length (nm)	Slit Width (nm)
1	Cd	6	228.8	0.2
2	Co	4	240.7	0.2
3	Cr	6	357.9	0.2
4	Cu	3	324.8	0.5
5	Pb	3	283.3	0.5
6	Mo	3	313.4	0.5
7	Ti	3	320.0	0.5
8	Zn	3	213.9	0.5

5.2.3. Estimation of Phthalates:

A 500 ml of water sample collected from each location or TCLP leachate was extracted three times using 30 ml of dichloromethane (HPLC grade) solvent in one litre separatory funnel each time. The micelle formation was suppressed by adding 10 ml of saturated sodium chloride solution during each operation. The organic layers were combined together and demoistered by passing through anhydrous granular sodium sulphate bed [EPA method-8060, Analysis of phthalate esters in water and waste water (1986); EPA method-3510, Separatory funnel liquid-liquid extraction (1986)]. Each sample was processed for column cleanup prior to analysis on HPLC. For proper cleanup, chromatographic column (300 mm length X 10 mm I.D.) was prepared by placing 10 g of activated Florisil on bed of Pyrex glass wool at the bottom. The column was tapped properly to settle the Florisil and further added 1 cm of anhydrous sodium sulfate to the top [EPA method-3620, Florisil column cleanup-1986]. Column was preluted with 40 ml n-Hexane (v/v). The compounds were eluted with 100 ml of 20% ethyl ether in hexane (v/v). The extract in hexane was concentrated under reduced pressure using rotary evaporator (Buchi, B 490). The exchange of solvent was done by replacing hexane with methanol (HPLC grade) and final volume was made up to 10 ml in volumetric flask.

The methodology was tested using water samples. Each sample was screened for 5 Phthalates viz. Di-methyl phthalate (DMP), Di-ethyl phthalate (DEP), Di-butyl phthalate (DBP), Di (2-ethylhexyl) phthalate (DEHP) and Di-octyl phthalate (DOP) by using HPLC under following conditions:

Equipment: HPLC, Water's make, pump-515; Column: RP, C-18; Temperature: 27° C.
Mobile phase: Methanol-water (90:10), Flow Rate 2 ml/rnin.
Detector: UV-VIS detector (Model 2487; Water's make), Wavelength: 254 nm.

To identify the chromatographic peaks, the five representative samples were analyzed on Gas chromatograph-Mass Spectrophotometer (GC-MS) using following conditions:

Equipment: GC-MS, Turbo Mass, Perkin Elmer, USA.
Column: DB-5ms low bleed (30X0.25 mm), Film thickness: 0.25 Om; Temperature programme: 1 min. hold at 70°C and raised the temperature up to 325°C @ 10^0 C/min.
Injector temperature: 250^0 C.
Mobile phase: Helium, Flow Rate 1.25 ml/min.
Ionization mode: EI; Mass resolution (m/z): 30-550; Scan rate: 10/sec; Ionization energy: 70 eV; Detector: Mass; Source temperature: 280^0 C.

Schematic Flow-Diagram of Phthalate Extraction from Water Samples ITCLP Leachate

500 ml of sample was taken in a separating funnel

Add 20 ml of sodium chloride to the sample

Thenafter add 30 ml of dichloromethane to the sample

1.

Resulting sample was shaken vigorously for 5 min with periodic venting to release excess pressure

Stand and allowed the organic layer to separate from water phase for a minimum of 10 min.

Collected organic layer and pool in a separate conical flask

Repeat the extraction two more times using fresh portions of solvent in the same manner

Combined three solvent extracts and process it for column cleanup

Concentrated the extract (eluate) up to dryness on rotavapour

Final volume was made up to 10 ml with filtered methanol solution

Estimation of Phthalate using HPLC

Source: EPA method-3510, Separatory funnel liquid-liquid extraction; 1986.
EPA method-3620, Florisil column cleanup; 1986.

Schematic Flow-Diagram of Phthalate Extraction from Soil Samples

5 gm of dry sample was taken

Extracted using Soxhlet apparatus with the help of 1:1 Acetone/n- Hexane mixture for approx. 18 hours

Collect the extract and process it for column cleanup

Concentrate the extract (eluate) upto dryness on rotavapour

Made up the final volume upto 10 ml with filtered methanol solution

Estimation of Phthalate using HPLC

Source: EPA method-8060, Analysis of phthalate esters in water and waste water; 1986.

5.2.4. Estimation of Chloride in leachates

In the leachate (each 20 ml), add 3 drops of $K_2Cr_20_7$, stirred well and titrated against 0.014 $AgNO_3$. The formula used is as follows:

$$Cl\ mg/L = \frac{(S-B) \times 0.5}{\text{ml of sample}} \times 1000$$

5.3 Sampling Conditions

5.3.1 Pre-monsoon Sampling

First phase of pre-monsoon sampling was conducted at four identified locations of Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow during April 12, 2009 to April 15, 2009 while second phase of pre-monsoon sampling was conducted at two identified locations of Municipal Solid Waste Dumpsite, Dudauli, Ghaila, Hardoi Road, Lucknow during May 04, 2009 to May 05, 2009. Conditions during sampling are given below.

Location I: Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow

Date	Time	Site	Location of Drilling	Temperature
12.04.09	6: 00 pm — 10: 30 pm	Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow	Point I	**36°±2** C
13.04.09	1:30 pm — 5:45 pm	Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow	Point II	**41° ±2** C
14.04.09	10:15 am — 12:15 pm	Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow	Point III	**42°** ±2 C
15.04.09	3:30 pm — 6: 45 pm	Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow	Point IV	**39°±2C**

Location II: Municipal Solid Waste Dumpsite, Ghaila, Hardoi Road, Lucknow

Date	Time	Site	Location of Drilling	Temperature
04.05.09	9: 00 am — 5: 00 pm	Municipal Solid Waste Dumpsite, Ghaila, Hardoi Road, Lucknow	Point I	**35°±2** C
05.05.09	8:30 am — 4:45 pm	Municipal Solid Waste Dumpsite, Ghaila, Hardoi Road, Lucknow	Point II	39°±2 C

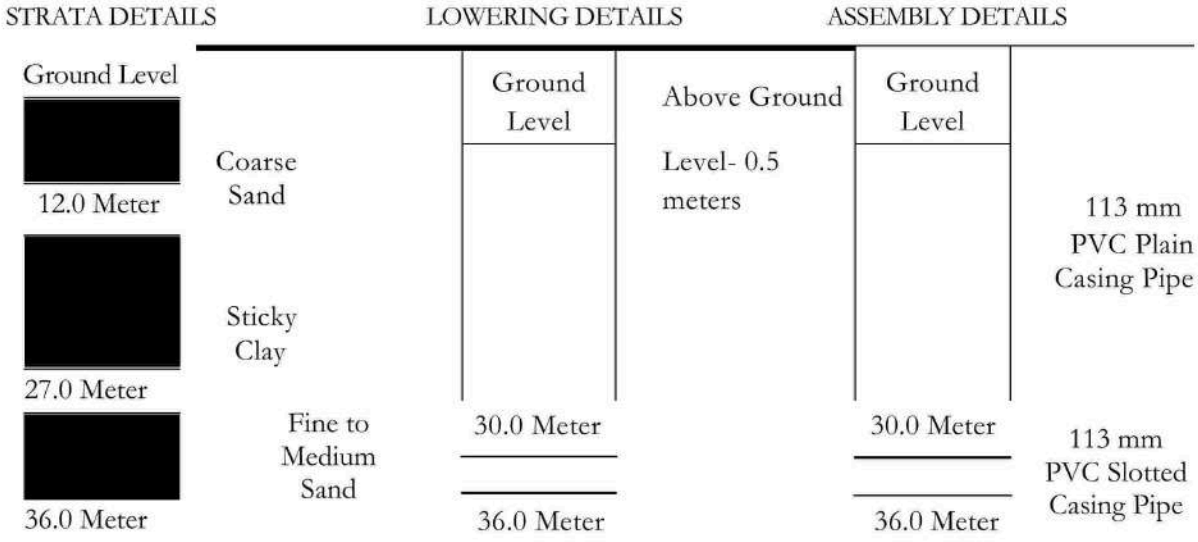
5.3.2 Post-monsoon Sampling

The proposed post-monsoon sampling was delayed for three months due to late monsoon conditions and prolonged water logging after heavy rains at Ghaila Municipal Solid Waste Dumpsite, Hardoi Road, Lucknow. Post-monsoon sampling was conducted at one identified location of Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow during September 28-30, 2009 while last phase of post-monsoon sampling was also conducted at one identified location of Municipal Solid Waste Dumpsite, Ghaila, Hardoi Road, Lucknow during December 9-10, 2009. Conditions during sampling are charted below.

	Date	Time	Site	Location of Drilling	Temperature
Location I	29.10.09	10:00 am — 05: 30 pm	Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow	Point I	29°±2C
Location II	09.12.09	9:30 am — 5:30 pm	Municipal Solid Waste Dumpsite, Ghaila, Hardoi Road , Lucknow	Point II	26°±2C

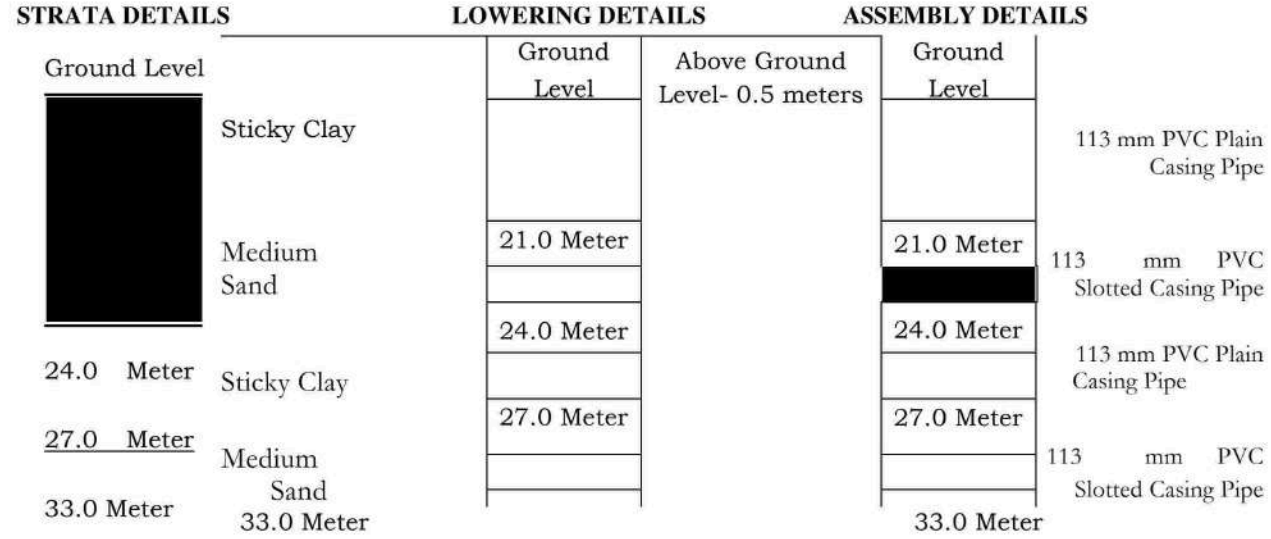
5.4 Geo-physical and Drilling Features of Dumpsite Area:

Strata Chart: Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow
Test Well No. 1 Static Water Level: 13.7 meter

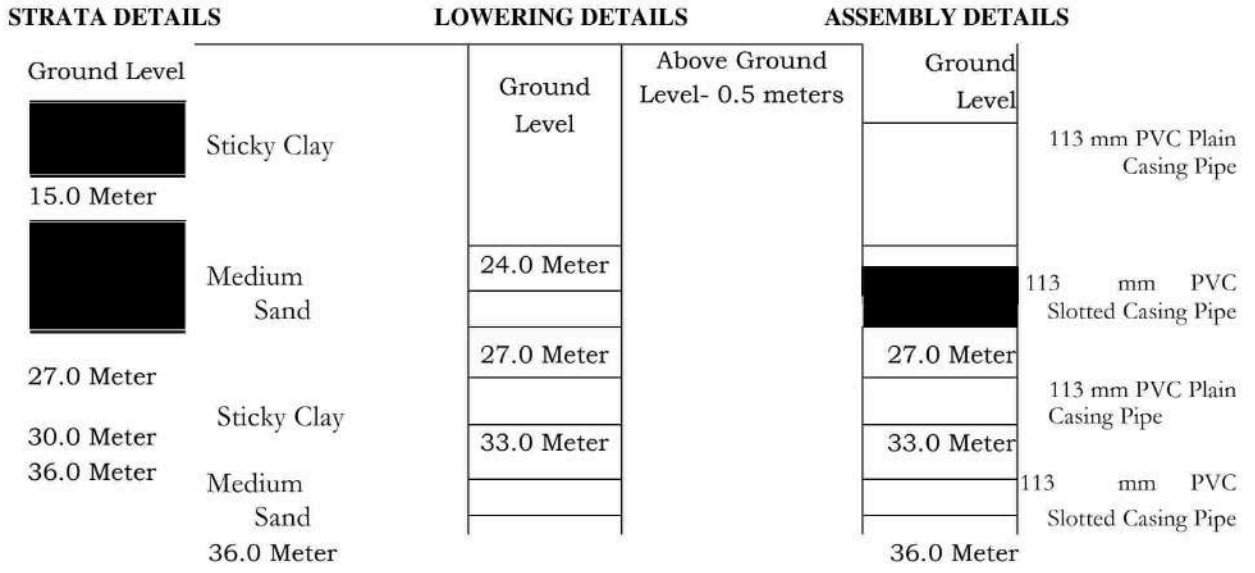


Page 15

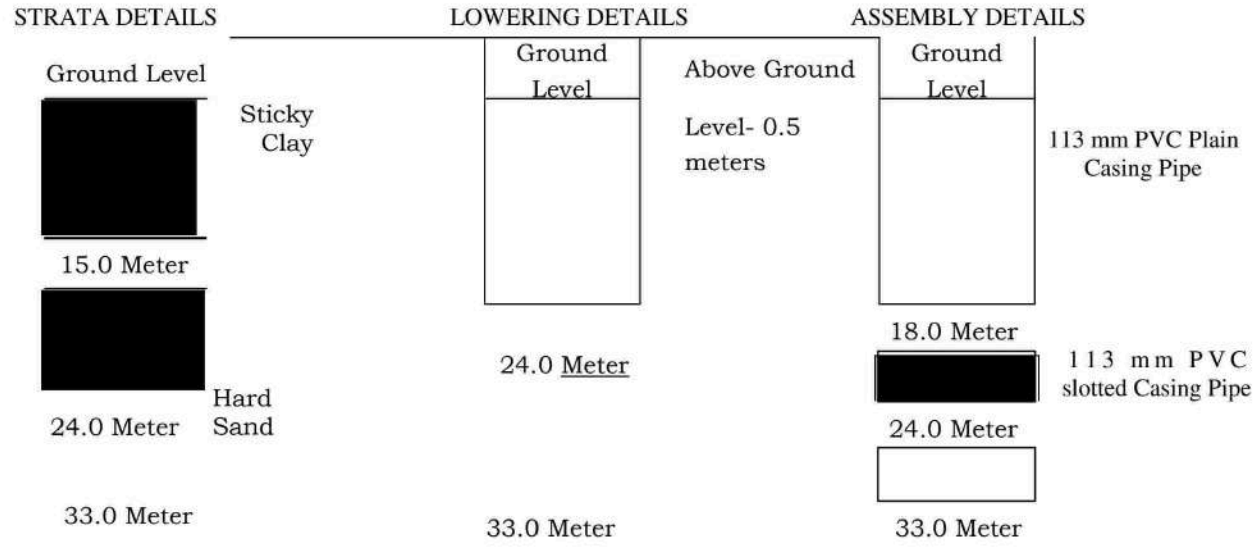
Strata Chart: Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow
Test Well No. 2 Static Water Level: 10.70 meter



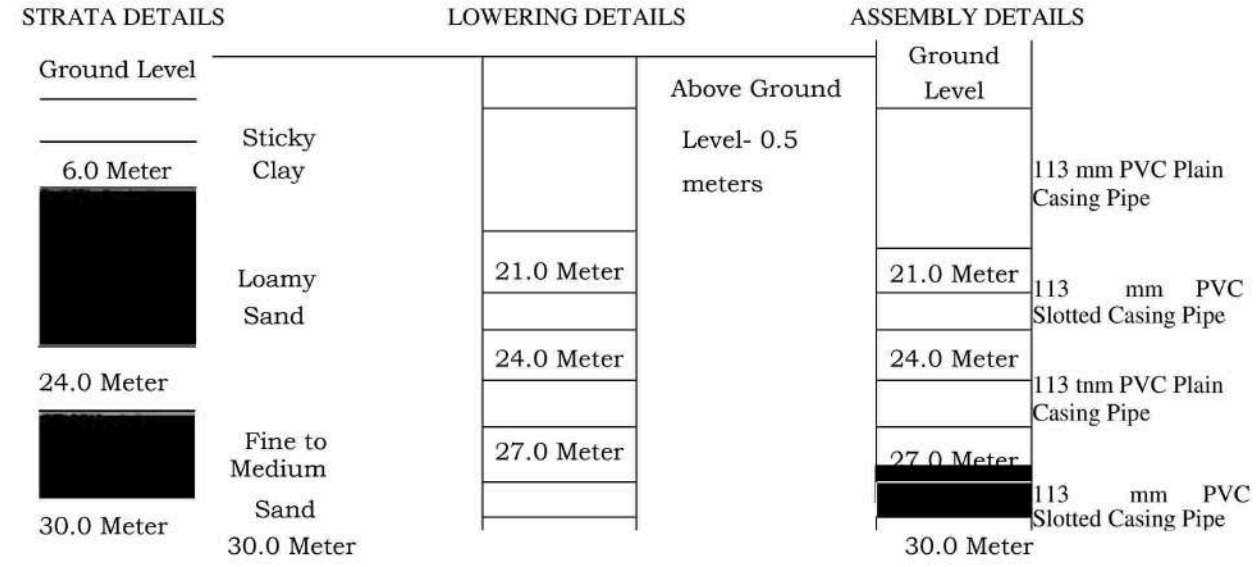
Strata Chart: Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow
Test Well No. 3 Static Water Level: 13.7 meter



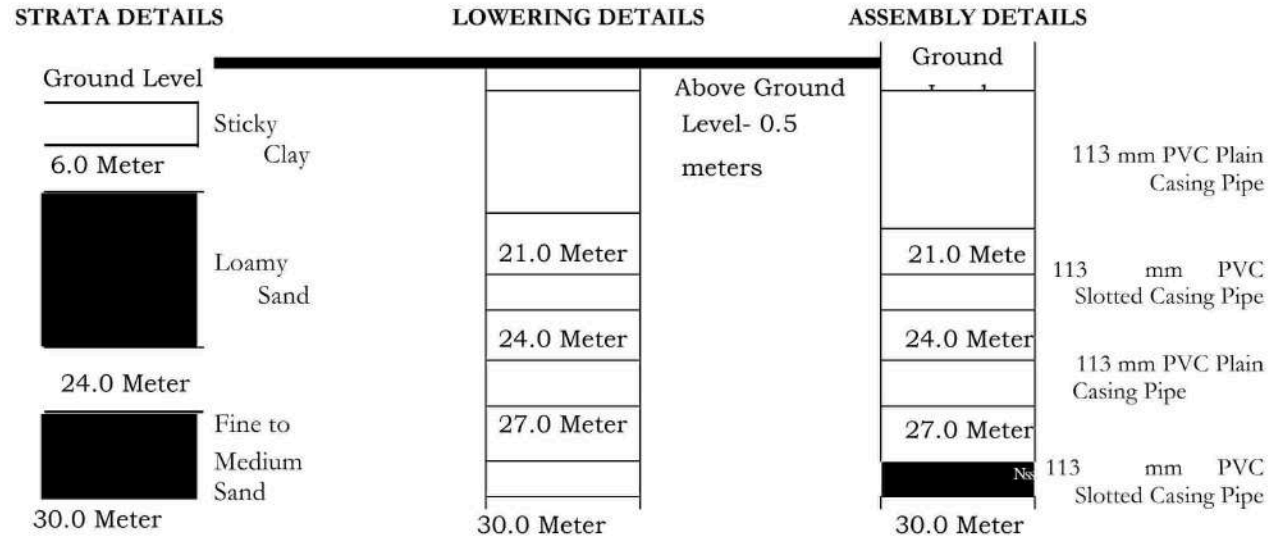
Strata Chart: Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow
Test Well No. 4 Static Water Level: 12.70 meter



Strata Chart: Municipal Solid Waste Dumpsite, Ghaila, Hardoi Road, Lucknow
Test Well No. **1** Static Water Level: 10.70 meter



Strata Chart: Municipal Solid Waste Dumpsite, Ghaila, Hardoi Road, Lucknow
Test Well No. 2 Static Water Level: 10.70 meter



6. Sampling Details

6.1 List of Soil Samples

Sample Code	IITR Code No.	Texture	Depth	Sample Container	Date of Sampling	Remarks, if any
Point I,	**Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road Lucknow (6: 00 pm — 10: 30**					
1.	AS 01/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Medium sand	3.4 meter	Cloth	12.04.09	Pre-monsoon [Experimental]
2.	AS 021D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sticky clay	6.45 meter (3.05 meter)	Cloth	12.04.09	Pre-monsoon [Experimental]
3.	AS 03/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + Gravel	9.50 meter (3.05 meter)	Cloth	12.04.09	Pre-monsoon [Experimental]
4.	AS 04/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sticky clay + Gravel	12.50 meter (3.0 meter)	Cloth	12.04.09	Pre-monsoon [Experimental]
5.	AS 05/D/Soil/ IITR Dudauli, Sitapur Road, Lucknovt	Sticky clay + Gravel	15.50 meter (3.0 meter)	Cloth	12.04.09	Pre-monsoon [Experimental]

6.	AS 06/0/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy clay + Gravel	18.50 meter (3.0 meter)	Cloth	12.04.09	Pre-monsoon [Experimental]
7.	AS 07/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy clay + Gravel+ Sand	21.50 meter (3.0 meter)	Cloth	12.04.09	Pre-monsoon [Experimental]
8.	AS 08/D/So1l/ IITR Dudauli, Sitapur Road, Lucknow	Loamy clay + Gravel	24.50 meter (3.0 meter)	Plastic	12.04.09	Pre-monsoon [Experimental]
9.	AS 09/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy clay + Gravel	27.50 meter (3.0 meter)	Plastic	12.04.09	Pre-monsoon [Experimental]
10.	AS 10/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy clay + Gravel	30.50 meter (3.0 meter)	Plastic	12.04.09	Pre-monsoon [Experimental]
11.	AS 11/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + Sand	33.50 meter (3.0 meter)	Cloth	12.04.09	Pre-monsoon [Experimental]
12.	AS 12/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sand	36.50 meter (3.0 meter)	Cloth	12.04.09	Pre-monsoon [Experimental]
Point II, Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow (1:30 pm - 5:45 pm)						
13.	AS 13/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sticky clay+ small gravels	3.4 meter	Cloth	13.04.09	Pre-monsoon [Experimental]
14.	AS 14/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sticky clay+ small gravels	6.45 meter (3.05 meter)	Cloth	13.04.09	Pre-monsoon [Experimental]
15.	AS 15/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sticky clay	9.50 meter (3.05 meter)	Cloth	13.04.09	Pre-monsoon [Experimental]
16.	AS 16/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sticky clay	12.50 meter (3.0 meter)	Cloth	13.04.09	Pre-monsoon [Experimental]

17.	AS 17/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sticky clay	15.50 meter (3.0 meter)	Cloth	13.04.09	Pre-monsoon [Experimental]
18.	AS 18/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sand + Gravel	18.50 meter (3.0 meter)	Cloth	13.04.09	Pre-monsoon [Experimental]
19.	AS 19/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy Sand	21.50 meter (3.0 meter)	Cloth	13.04.09	Pre-monsoon [Experimental]
20.	AS 20/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy Sand	24.50 meter (3.0 meter)	Cloth	13.04.09	Pre-monsoon [Experimental]
21.	AS 21/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy Sand	27.50 meter (3.0 meter)	Cloth	13.04.09	Pre-monsoon [Experimental]
22.	AS 22/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sand	30.50 meter (3.0 meter)	Cloth	13.04.09	Pre-monsoon [Experimental]
23.	AS 23/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sand	33.50 meter (3.0 meter)	Cloth	13.04.09	Pre-monsoon [Experimental]
Point II, Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow (10:15 am - 12:15 Pm)						
24.	AS 24/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy Sand	3.4 meter	Cloth	14.04.09	Pre-mansoon [Experimental]
25.	AS 25/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy Sand + gravel	6.45 meter (3.05 meter)	Cloth	14.04.09	Pre-mansoon [Experimental]
26.	AS 26/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + garvel	9.50 meter (3.05 m)	Cloth	14.04.09	Pre-monsoon [Experimental]
27.	AS 27/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + garvel	12.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]

28.	AS 28/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + garvel	15.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
29.	AS 29/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + garvel	18.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
30.	AS 30/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy Sand	21.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
31.	AS 31/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy Sand	24.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
32.	AS 32/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy Sand	27.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
33.	AS 33/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy Sand	30.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
34.	AS 34/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sand	33.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
35.	AS 35/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sand	36.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
Point IV, Municipal Solid Waste Dumpsite, Dudaul", Sitapur Road, Lucknow (3:30 pm- 6: 45 pm)						
36.	AS 36/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + Mud	3.4 meter	Cloth	14.04.09	Pre-monsoon [Experimental]
37.	AS 37/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + Mud	6.45 meter (3.05 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
38.	AS 38/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + Gravel	9.50 meter (3.05 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]

39.	AS 39/D/Soil/IITR Dudauli, Sitapur Road, Lucknow	Clay + Gravel	12.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
40.	AS 40/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + Gravel	15.50 meter (3.0 meter)	Cloth		Pre-monsoon [Experimental]
41.	AS 41/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy Sand	18.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
42.	AS 42/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy Sand	21.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
43.	AS 43/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sticky Clay	24.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
44.	AS 44/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + sand + Gravel	27.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
45.	AS 45/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sand	30.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
46.	AS 46/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sand	33.50 meter (3.0 meter)	Cloth	14.04.09	Pre-monsoon [Experimental]
Point I, Municipal Solid Waste Dumpsite, Ghaila, Hardoi Road, Lucknow (10:30 am- 4: 45 pm)						
47.	AS 47/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Sticky clay	3.4 meter	Cloth	04.05.09	Pre-monsoon [Experimental]
48.	AS 48/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy Sand	6.45 meter (3.05 meter)	Cloth	04.05.09	Pre-monsoon [Experimental]
49.	AS 49/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy Sand	9.50 meter (3.05 meter)	Cloth	04.05.09	Pre-monsoon [Experimental]

50.	AS 50/G/Soil/IITR, Ghaila, Hardoi Road, Lucknow	Lomy Sand	12.50 meter (3.0 meter)	Cloth	04.05.09	Pre-monsoon [Experimental]
51.	AS 51/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy Sand	15.50 meter (3.0 meter)	Cloth	04.05.09	Pre-monsoon [Experimental
52.	AS 52/G/Soil/ IITR, Ghaila, Hardoi Road, Luthnow	Loamy Sand	18.50 meter (3.0 meter)	Cloth	04.05.09	Pre-monsoon [Experimental]
53.	AS 53/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy Sand	21.50 meter (3.0 meter)	Cloth	04.05.09	Pre-monsoon [Experimental]
54.	AS 54/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy Sand	24.50 meter (3.0 meter)	Cloth	04.05.09	Pre-monsoon [Experimental]]
55.	AS 55/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Sand	27.50 meter (3.0 meter)	Cloth	04.05.09	Pre-monsoon [Experimental]
56.	AS 56/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Sand	30.50 meter (3.0 meter)	Cloth	04.05.09	Pre-monsoon [Experimental]
Point II, Municipal Solid Waste Dumpsite, Ghila, Hardoi Road, Lucknow (8:30 am- 11:30am)						
57.	AS 57/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Sticky clay	3.4 meter	Cloth	05.05.09	Pre-monsoon [Experimental]
58.	AS 58/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Sticky clay	6.45 meter (3.05 meter)	Cloth	05.05.09	Pre-monsoon [Experimental]
59.	AS 59/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy Sand	9.50 meter (3.05 meter)	Cloth	05.05.09	Pre-monsoon [Experimental]
60.	AS 60/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy Sand	12.50 meter (3.0 meter)	Cloth	05.05.09	Pre-monsoon [Experimental]
61.	AS 61/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy Sand	15.50 meter (3.0 meter)	Cloth	05.05.09	Pre-monsoon [Experimental]
62.	AS 62/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy Sand	18.50 meter (3.0 meter)	Cloth	05.05.09	Pre-monsoon [Experimental]

63.	AS 63/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy Sand	21.50 meter (3.0 meter)	Cloth	05.05.09	Pre-monsoon [Experimental]
64.	AS 641G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy Sand	24.50 meter (3.0 meter)	Cloth	05.05.09	Pre-monsoon [Experimental]
65.	AS 65/G/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Sand	27.50 meter (3.0 meter)	Cloth	05.05.09	Pre-monsoon [Experimental]
66.	AS 66/0/Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Sand	30.50 meter (3.0 meter)	Cloth	04.05.09	Pre-monsoon [Experimental]
67.	AS 67/C/Soil/ IITR, Sitapur Road (FaizullaGanj, near old Kisan Mandi), Lucknow	Clay + gravel	5 cm below from upper layer	Cloth	07.08.08	Pre-monsoon [Control]
68.	AS 68/ C /Soil/ IITR, Ghaila, Hardoi Road, Lucknow	Loamy clay	5 cm below from upper layer	Cloth	07.08.08	Pre-monsoon [Control]
69.	AS 69/ C /Soil/ IITR, Ghaila, Hardoi Road (Near temple, opposite to dumpsite), Lucknow	Rough clay	5 cm below from upper layer	Cloth	07.08.08	Pre-monsoon [Control]
70.	AS 70/ C /Soil/ IITR, Jiamau, Lucknow	Rough clay	5 cm below from upper layer	Cloth	07.08.08	Pre-monsoon [Control]
71.	AS 71/ C /Soil/ IITR, Jiamau, Lucknow	Loamy clay	5 cm below from upper layer	Cloth	07.08.08	Pre-monsoon [Control]
72.	AS 72/ C /Soil/ IITR, Manas Nagar, Jiamau, Lucknow	Rough clay	5 cm below from upper layer	Cloth	06.11.08	Pre-monsoon [Control]
73.	AS 73/ C /Soil/ IITR, RamaBai Sthali, Ashiana Lucknow	Rough clay	5 cm below from upper layer	Cloth	06.11.08	Pre-monsoon [Control]
74.	AS 74/ C /Soil/ IITR, Kila Mohannmadi Nagar, Smriti Park, Ashiana, Lucknow	Rough clay	5 cm below from upper layer	Cloth	06.11.08	Pre-monsoon [Control]
75.	AS 75/ C /Soil/ IITR, B Block, Indira Nagar, Lucknow	Rough clay	5 cm below from upper layer	Cloth	06.11.08	Pre-monsoon [Control]
76.	AS 76/ C /Soil/ IITR, C Block, Lucknow	Rough clay	5 cm below from upper layer	Cloth	06.11.08	Pre-monsoon [Control]
77.	AS 77/ C /Soil/ IITR, Gheru Soil, Lucknow	Rough clay	5 cm below from upper layer	Cloth	3.12.08	Pre-monsoon [Control]

78.	AS 78/C /Soil/ IITR, Alambagh, Lucknow	Rough clay	5 cm below from upper layer	Cloth	3.12.08	Pre-monsoon [Control]
79.	AS 79/ C /Soil/ IITR, IITR Gate, Lucknow	Rough clay	5 cm below from upper layer	Cloth	06.01.09	Pre-monsoon [Control]
80.	AS 80/ C /Soil/ IITR, IITR Gate, Lucknow	Rough clay	5 cm below from upper layer	Cloth	06.08.09	Pre-monsoon [Control]
81.	AS 81/ C /Soil/ IITR, Sitapur Road (FaizullaGanj, near old Kisan Mandi), Lucknow	Rough clay	5 cm below from upper layer	Cloth	29.10.09	Post-monsoon [Control]
82.	AS 82/ C /Soil/ IITR, Kila Mall Ghaila, Lucknow	Rough clay	5 cm below from upper layer	Cloth	29.10.09	Post-monsoon [Control]
83.	AS 83/ C /Soil/ IITR, Ghaila, Hardoi Road (Near temple, opposite to dumpsite), Lucknow	Rough clay	5 cm below from upper layer	Cloth	29.10.09	Post-monsoon [Control]
84.	AS 84/ C /SoiV IITR, Jiamau, Lucknow	Rough clay	5 cm below from upper layer	Cloth	30.10.09	Post-monsoon [Control]
85.	AS 85/ C /Soil/ IITR, Jiamau, Lucknow	Rough clay	5 cm below from upper layer	Cloth	30.10.09	Post-monsoon [Control]
86.	AS 86/ C /Soil/ IITR, Manas Nagar, Lucknow	Rough clay	5 cm below from upper layer	Cloth	30.10.09	Post-monsoon [Control]
87.	AS 87/ C /Soil/ IITR, RamaBai Sthali, Ashiana	Rough clay	5 cm below from upper layer	Cloth	30.10.09	Post-monsoon [Control]
88.	AS 88/ C /Soil/ IITR, IITR Gate, Lucknow	Rough clay	5 cm below from upper layer	Cloth	30.10.09	Post-monsoon [Control]

Sample Code	IITR Code No.	Texture	Depth	Sample Container	Date of Sampling	Remarks, if any
Point I – Municipal Solid Waste Dumpsite Dudauli, Sitapur Road, Lucknow (9:00 am -12:00 pm)						
	AS 89/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Medium sand	3.4 meter	Cloth	29.10.09	Post-monsoon [Experimental]
90.	AS 901D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sticky clay	6.45 meter (3.05 meter)	Cloth	29.10.09	Post-monsoon [Experimental]
91.	AS 91/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + Gravel	9.50 meter (3.05 meter)	Cloth	29.10.09	Post-monsoon [Experimental]
92.	AS 92/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sticky clay + Gravel	12.50 meter (3.0 meter)	Cloth	29.10.09	Post-monsoon [Experimental]
93.	AS 93/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sticky clay + Gravel	15.50 meter (3.0 meter)	Cloth	29.10.09	Post-monsoon [Experimental]
94.	AS 94/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy clay + Gravel	18.50 meter (3.0 meter)	Cloth	29.10.09	Post-monsoon [Experimental]
95.	AS 951D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy clay + Gravel+ Sand	21.50 meter (3.0 meter)	Cloth	29.10.09	Post-monsoon [Experimental]
96.	AS 96/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy clay + Gravel	24.50 meter (3.0 meter)	Cloth	29.10.09	Post-monsoon [Experimental]
97.	AS 97/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy clay + Gravel	27.50 meter (3.0 meter)	Cloth	29.10.09	Post-monsoon [Experimental]
98.	AS 98/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Loamy clay + Gravel	30.50 meter (3.0 meter)	Cloth	29.10.09	Post-monsoon [Experimental]
99.	AS 991D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Clay + Sand	33.50 meter (3.0 meter)	Cloth	29.10.09	Post-monsoon [Experimental]
100.	AS 100/D/Soil/ IITR Dudauli, Sitapur Road, Lucknow	Sand	36.50 meter (3.0 meter)	Cloth	29.10.09	Post-monsoon [Experimental]

Sample code	IITR Code No.	Texture	Depth	Sample Container	Date of Sampling	Remarks, if any
Point I Municipal Solid Waste Dumpsite, Ghaila, Hardoi, Lucknow (9:00 am -5:00 pm)						
101.	AS 101/0/Soil/ IITR Ghaila, Hardoi Road , Lucknow	Sticky Clay	3.4 meter	Cloth	09.12.09	Postmonsoon [Experiment]
102.	AS 102/0/Soil/ IITR Ghaila, Hardoi Road , Lucknow	Loamy Sand	6.45 meter (3.05 meter)	Cloth	09.12.09	Postmonsoon [Experiment]
103.	AS 103/ G /Soil/ IITR Ghaila, Hardoi Road, Lucknow	Loamy Sand	9.50 meter (3.05 meter)	Cloth	09.12.09	Postmonsoon [Experimental]
104.	AS 104/C /Soil/ IITR Ghaila, Hardoi Road, Lucknow	Loamy Sand	12.50 meter (3.0 meter)	Cloth	09.12.09	Postmonsoon [Experimental]
105.	AS 105/ G /Soil/ IITR Ghaila, Hardoi Road, Lucknow	Loamy Sand	15.50 meter (3.0 meter)	Cloth	09.12.09	Postmonsoon [Experimental]
106.	AS 106/ G /Soil/ IITR Ghaila, Hardoi Road, Lucknow	Loamy Sand	18.50 meter (3.0 meter)	Cloth	09.12.09	Postmonsoon [Experimental]
107.	AS 107/ G /Soil/ IITR Ghaila, Hardoi Road, Lucknow	Loamy Sand	21.50 meter (3.0 meter)	Cloth	09.12.09	Postmonsoon [Experimental]
108.	AS 108/ G /Soil/ IITR Ghaila, Hardoi Road, Lucknow	Loamy Sand	24.50 meter (3.0 Meter)	Cloth	09.12.09	Postmonsoon [Experimental]
109.	AS 109/C /Soil/ IITR Ghaila, Hardoi Road, Lucknow	Sand	27.50 meter (3.0 meter)	Cloth	90.12.09	Postmonsoon [experimental]
110.	AS 110/ G /Soil/ IITR Ghaila, Hardoi Road, Lucknow	Sand	30.50 meter (3.0 meter)	Cloth	09.12.09	Postmonsoon [Experimental]

6.2 List of Water Samples

Sample Code	IITR Code No.	Depth	Sample Container	Date of Sampling	Remarks, if any
Pre-monsoon Experimental Water Samples (collected from MSW dumpsite)					
Point I, Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow (6:30 am— 7:45 am)					
1.	AS 01/D/Water/ IITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	17.04.09	Premonsoon [Experiment all
2.	AS 02/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	17.04.09	Premonsoon [Experiment all
3.	AS 03/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	17.04.09	Premonsoon [Experiment al]
Point II, Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow (3:00 pm-4:45pm)					
4.	AS 04/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	15.04.09	Premonsoon [Experiment al]
5.	AS 05/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	15.04.09	Premonsoon [Experiment al]
6.	AS 06/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	15.04.09	Premonsoon [Experiment al]
Point III, Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow (11:00am-1:45pm)					
7.	AS 07/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	15.04.09	Premonsoon [Experiment all

8.	AS 08/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	15.04.09	Premonsoon [Experiment all
9.	AS 09/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	15.04.09	Premonsoon [Experiment al]
Point IV, Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow (8:30 am- 10: 15 am)					
10.	AS 10/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	17.04.09	Premonsoon [Experiment al]
11.	AS 11/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	17.04.09	Premonsoon [Experiment al]
12.	AS 12/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	17.04.09	Premonsoon [Experiment al]

Sample Code	IITR Code No.	Depth	Sample Container	Date of Sampling	Remarks, if any
Point V, Municipal Solid Waste Dumpsite, Ghaila Hardoi Road, Lucknow (10:30 am—3: 30 pm)					
13.	AS 13/GNVater/ IITR Ghaila, Hardoi Road, Lucknow	30.85 meter	Glass Bottle	04.05.09	Premonsoon [Experiment al]
14.	AS 14/G/ Water / IITR Ghaila, Hardoi Road, Lucknow	30.85 meter	Glass Bottle	04.05.09	Premonsoon [Experiment al]
15.	AS 15/G/ Water / IITR Ghaila, Hardoi Road, Lucknow	30.85 meter	Glass Bottle	04.05.09	Premonsoon [Experiment al]

Point VI, Municipal Solid Waste Dumpsite, Ghaila, Hardoi Road, Lucknow (8:00am-11:45am)					
16.	AS 16/G/ Water / IITR Ghaila, Hardoi Road, Lucknow	30.85 meter	Glass Bottle	06.05.09	Premonsoon [Experiment al]
17.	AS 17/G/ Water / IITR Ghaila, Hardoi Road, Lucknow	30.85 meter	Glass Bottle	06.05.09	Premonsoon [Experiment al]
18.	AS 18/G/ Water / I ITR Ghaila, Hardoi Road, Lucknow	30.85 meter	Glass Bottle	06.05.09	Premonsoon [Experiment al]
Pre-monsoon Control Water Samples					
19.	AS 19/C/Water/ IITR HP Water, Dudauli, Sitapur Road, Lucknow	Hand Pump	Glass Bottle	04.05.09	Pre- monsoon [Control]
20.	AS 20/C/ Water / IITR Ghaila, Hardoi Road, Lucknow	Hand Pump	Glass Bottle	07.08.08	Premonsoon [Control]
21.	AS 21/C/ Water / IITR IITR, Main Campus, Lucknow	Tap Water	Glass Bottle	10.01.09	Premonsoon [Control]
22.	AS 22/C/ Ghaila Tube well water,, Hardoi Road, Lko	Tube well water	Glass Bottle	04.05.09	Pre- monsoon [Control]
23.	AS 23/C/ Water / IITR Ghaila Pond water,, Hardoi Road, Lko	Pond Water	Glass Bottle	05.05.09	Premonsoon [Control]
24.	AS 24/C/ Water / IITR Dudauli Tube well water, Sitapur Road, Lko	Tube well water	Glass Bottle	21.04.09	Premonsoon [Control]

Sample Code	IITR Code No.	Depth	Sample Container	Date of Sampling	Remarks, if any
Post-monsoon Experimental Water Samples (collected from MSW dumpsite)					
Point I, Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow (6:30 am— 7: 45 am)					
25.	AS 25/D/Water/ IITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]
26.	AS 26/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]
27.	AS 27/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]

Point II Municipal Solid Waste Dumpsite Dudauli, Sitapur Road, Lucknow (3:00 pm— 4: 45 pm)					
28.	AS 28D/ Water / IITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]
29.	AS 29/D/ Water / IITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]
30.	AS 30/D/ Water! I ITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]
Point III, Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow (11:00 am— 1: 45 pm)					
31.	AS 31/D/ Water / I ITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]
32.	AS 32/D/ Water! I ITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]
33.	AS 33/D/ Water / I ITR Dudauli, Sitapur Road, Lucknow	36.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]
Point IV, Municipal Solid Waste Dumpsite, Dudauli, Sitapur Road, Lucknow (8:30 am— 10: 15 am)					
34.	AS 34D/ Water! IITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]
35.	AS 35/D/ Water / I ITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]
36.	AS 36/D/ Water! I ITR Dudauli, Sitapur Road, Lucknow	33.50 meter	Glass Bottle	30.10.09	Post-monsoon [Experimental]
Sample Code	IITR Code **No.**	Depth	Sample Container	Date of Sampling	Remarks, if any
Point V Municipal Solid Waste Dumpsite Ghaila, Hardoi Road, Lucknow (10:30 am— 3: 30 pm)					
37.	AS 37/G/VVater/ IITR Ghaila, Hardoi Road, Lucknow	30.85 meter	Glass Bottle	10.12.09	Post-monsoon [Experimental]
38.	AS 38/G/ Water / IITR Ghaila, Hardoi Road, Lucknow	30. 85 meter	Glass Bottle	10.12.09	Post-monsoon [ExRerimental]

39.	AS 39/G/ Water / IITR Ghaila, Hardoi Road, Lucknow	30.85 meter	Glass Bottle	10.12.09	Post-monsoon [Experimental]
Point VI, Municipal Solid Waste Dumpsite, Ghaila, Hardoi Road, Lucknow (9:00am-10:45am)					
40.	AS 40/G/ Water / I ITR Ghaila, Hardoi Road, Lucknow	30.85 meter	Glass Bottle	10.12.09	Post-monsoon [Experimental]
41.	AS 41/G/ Water / IITR Ghaila, Hardoi Road, Lucknow	30.85 meter	Glass Bottle	10.12.09	Post-monsoon [Experimental]
42.	AS 42/G/ Water / IITR Ghaila, Hardoi Road, Lucknow	30.85 meter	Glass Bottle	10.12.09	Post-monsoon [Experimental]
Post-monsoon Control Water Samples					
43.	AS 43/C/VVater/ IITR HP Water, Dudauli, Sitapur Road, Lucknow	Hand Pump	Glass Bottle	30.10.09	Post-monsoon [Control]
44.	AS 44/C/ Water / I ITR Ghaila, Hardoi Road, Lucknow	Hand Pump	Glass Bottle	30.10.09	Post-monsoon [Control]
45.	AS 45/C/ Water / I ITR IITR, Main Campus, Lucknow	Tap Water	Glass Bottle	30.10.09	Post-monsoon [Control]
46.	AS 46/C/ Ghaila Tube well water, Hardoi Road, Lko	Tube well water	Glass Bottle	30.10.09	Post-monsoon [Control]
47.	AS 47/C/ Water / I ITR Ghaila Pond water,, Hardoi Road, Lko	Pond Water	Glass Bottle	30.10.09	Post-monsoon [Control]
48.	AS 48/C/ Water / I ITR Dudauli Tube well water, Sitapur Road, Lko	Tube well water	Glass Bottle	30.10.09	Post-monsoon [Control]

7. Analysis of soil & water samples:

7.1 Physio-chemical Parameters of Soil;

(Soil pH is a measurement of the soil acidity (pH<7) or soil alkalinity (pH>7). Soil solutions were extracted from the dumpsite as well as control soil by **lysimetric method** for determination of pH. The data obtained are presented in Figure 1. Observations reveaied that **the pH of dumpsite soil samples** collected in **post monsoon season was comparatively more basic than the pre monsoon** sampleThe similar trend was also observed in control soil samples. All the samples have pH>7 indicating occurrence of alkaline soil. It may be due to poor soil texture of sampling point 1-4, and upper soil portion of sampling point 5-6 which have thick hard calcareous (kankar) layers of low infiltration capacity in their soil profile. Such soil becomes alkaline due to presence of carbonates and bicarbonates of calcium, magnesium, sodium, and potassium held by soil colloids. During post-monsoon season, high rainfall occurred at both sampling location at **dumped waste containing high plastic contents** as well **as hard soil profile of low infiltration capacity caused water logging** at Ghaila dumpsite area. The irrigated water contained lime which might precipitated in the upper regions of dumpsite area nearest the water delivery inlets and in the water flow path. Due to prolonged water logging it has resulted into higher alkalinity of soil and pH levels rising to 7.0 and above until equilibrium is reached with atmospheric carbon dioxide levels. Such increase in soil pH occurs more rapidly on coarse and medium-textured soils than on clays which are more highly buffered. Higher pH values of soil may be due to above factors at Dudauli dumpsite and Locations 5 and 6 of Ghaila dumpsite area.

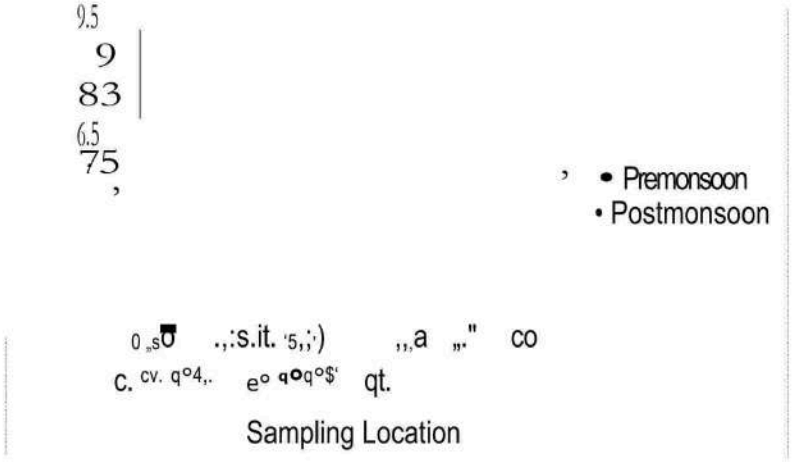


Fig. 1: Mean pH of collected soil samples of each sampling location in different monsoon seasons

7.2 Chemical Property of Soil Samples

Assessment of soil quality with respect to its chemical composition was also done by evaluating essential mineral level viz, available phosphorous as phosphate (in kg/ha), available potassium (in kg/ha), available nitrogen (in kg/ha) and chloride level (mg/kg). The data obtained are presented in **figure 2-5** revealed that control and dumpsite soil samples collected after rainfall (post monsoon samples) were comparatively found to be more enriched with essential minerals/ions. Availability of phosphorous and potassium was found to be higher in control soil samples than dumpsite samples indicating the depletion of nutritional quality of dumpsite soil due to dumping of municipal solid was, However, higher concentration of nitrogen and chloride ion was found throughout the soil profile of dumpsite area. The probable reason may be decomposition of landfilled/dumped waste under environmental conditions leading to formation of different characteristic chemical moieties viz, nitrogen, methane, chloride, phosphate etc. Such species were prominently found in higher concentration at Dudauli Municipal Solid Waste dumpsite area in comparison to Ghaila Municipal Solid Waste dumpsite because of high load of dumped waste in larger area at Dudauli dumpsite. It is worth to mention that significant amount of analytes were found throughout different soil layers and levels were comparatively higher in post monsoon season, specially in case of Ghaila dumpsite samples, indicating constant percolation of such analytes in the soil profile.

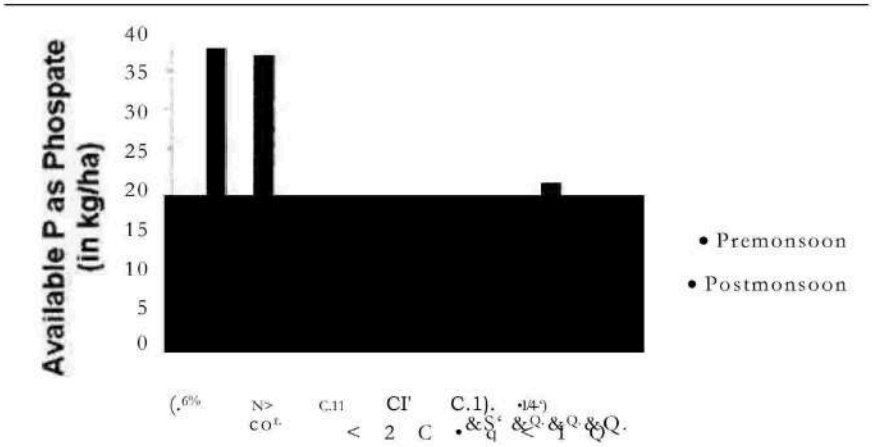


Fig 2: Mean Concentration of Available Phosphorous (P) as Phosphate in Collected Soil Samples of each Sampling location in different Monsoon Seasons

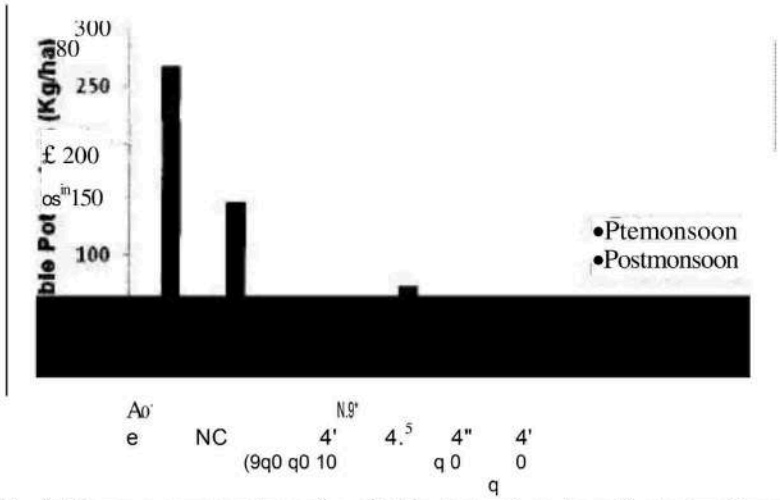


Fig 3: Mean concentration of available potassium in collected soil samples of each sampling location in different monsoon seasons

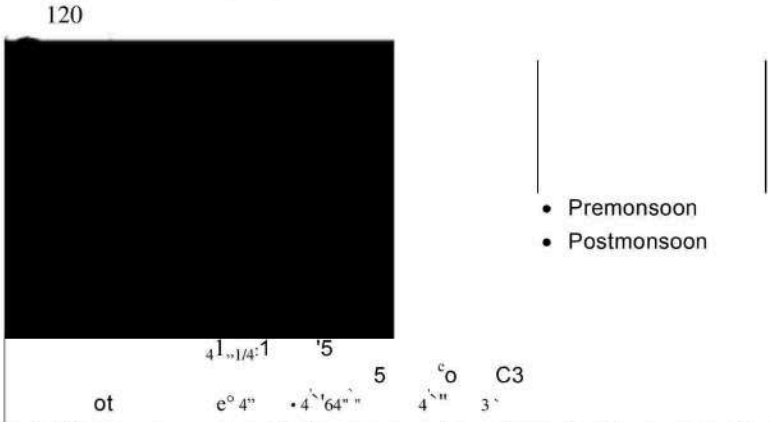


Fig 4: Mean values of available nitrogen in collected soil samples of each sampling location in different monsoon seasons

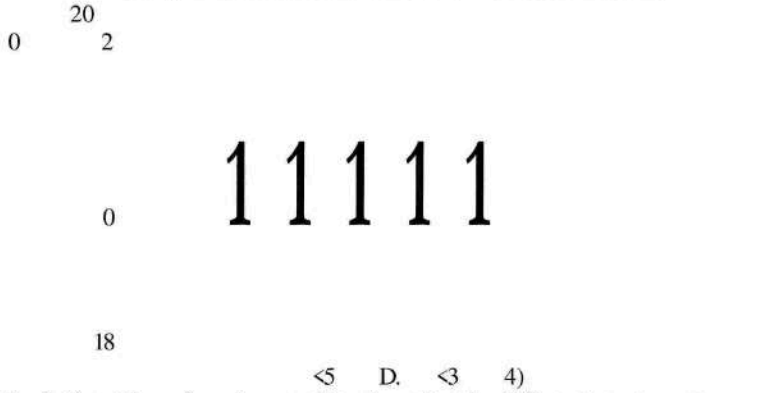


Fig 5: Samples of each sampling location in different monsoon seasons

7.3 Heavy Metals and Organic Contaminants in Soil Samples:

Heavy metals viz Cd,Co,Cr, Cu, Pb, Mo, Ti and Zn were analyzed in all control soil (22 nos.) samples (14 pre monsoon + 08 post monsoon) and experimental/dumpsite soil (88 nos.) samples (66 pre-monsoon + 22 Post monsoon). In addition level of phthalates viz. Di-methyl phthalate (DMP), Diethylphthalate (DEP), Di-butyl phthalate (DBP), Di (2-ethylhexyl) phthalate (DEHP) and Di-octyl phthalate (DOP) were also determined in leachates (TCLP) of soil samples. Data revealed that Ghaila Landfill site having coarse or sandy texture of soil have greater contamination of inorganic and organic moieties throughout soil profile and in deep aquifers because rain water leachates containing pool of contaminants may easily percolate throughi)On the other hand, impact of pollutants appeared more on upper strata soil and side streams at Dudauli waste dumpsite having clay, gravels or rocky soil texture. In addition, seasonal fluctuations also dominates on the quality and quantity of landfill leachate produced. During the wet season period (post monsoon), low-strength leachate may suppose to generate, while during the dry season period (pre monsoon), reduced percolation and enhanced evaporation increase the leachate strength.

Soils have property to bind various chemicals and it depends on the form in which they exist in the environment. It consists of mineral particles, organic matter and organic-mineral particles. They play important role in giving the soil's ability to absorb exchange, oxidize, reduce, catalyze and precipitate chemical and metal ions in particular. The inorganic colloidal fraction of soil is the most responsible for absorption by its mineral particles. Its large surface area and porosity makes it good absorber of organic and inorganic materials. Organic and inorganic moieties physically adsorb on soil surface instead of being chemically absorb. Due to variation in pH, temperature, weathering or flow of water from refusal tips such contaminants may migrate and percolates into lower soil strata or underground water profile. The period of waste dumping was also found to be an important parameter to characterize the leachate and to predict the environmental implications of waste dumping. Age of the landfill corresponding to stabilization stage has a significant effect on characteristic composition of leachate, as found at Dudauli dumpsite where dumping is continued since last five years and Ghaila dumpsite which is active since last three years. The observed value revealed that the quantity of leachate produced may be regarded as proportional to the volume of water percolating through the landfilled waste. Reduction of the quantity of water entering the tip is of great importance in reducing the rate of leachate generation. Leachate production has been found to be higher when the disposed refuse is less compacted since compaction was found to reduce the filtration rate.

7.3 Heavy Metals in Water Samples :

Heavy metals viz. Cd, Co, Cr, Cu, Pb, Mo, Ti and Zn were analyzed in all control water (12 nos.) samples (06 pre monsoon + 06 post monsoon) and experimental/dumpsite water (36 nos.) samples (18 pre monsoon + 18 post monsoon). The analytical data as presented in **table 5** revealed that Cd, Co and Ti were found below detection limit (BDL) in all 48 samples. However, Cu and Zn are present in significant concentration in all samples. Further, levels of Pb, Mo and Cr were found in traces and the concentration above permissible limit was found only in few samples of first strata water. There was no significant difference in level of heavy metals in pre-monsoon and post-monsoon water samples as seen in case of soil samples. This may be due to dilution factor because of rainfall. However, presence of heavy metals in traces in first strata in the underground water of d psite area, may occur due to percolation of such heavy metals from dumping of municipal solid waste including plastic waste. The effect of percolation was more at Ghaila dumpsite area having sandy soil texture than Dudauli dumpsite area with hard clay and gravels in soil profile. The concentration of Heavy Metals is mentioned at **Table-5.**

Table- 5: Concentration of Heavy Metals in Water Samples

CADMIUM (Cd)	Pre-monsoon Samples	Post-monsoon Samples
Concentration (mg/l)	Control	Control
Total	0	0
Average	0	0
Standard Deviation	0	0
Maximum value	0	0
Minimum value	0	0
	Experimental	Experimental
Total	0	0
Average	0	0
Standard Deviation	-	-
Maximum value	-	-
Minimum value	-	-

COBALT (Co)	Pre-monsoon *Samples*	Post-monsoon *Samples*
Concentration (mg/l)	Control	Control
Total	0	0
Average	0	0
Standard Deviation	0	0
Maximum value	0	0
Minimum value	0	0
	Experimental	Experimental
Total	0	0
Average	0	0
Standard Deviation	-	-
Maximum value	-	-
Minimum value	-	-

CHROMIUM (Cr)	Pre-monsoon *Samples*	Post-monsoon *Samples*
Concentration (mg/I)	Control	Control
Total	0	0
Average	0	0
Standard Deviation	0	0
Maximum value	0	
Minimum value	0	0
	Experimental	Experimental
Total	1.108	0.080
Average	0.061	0.004
Standard Deviation	0.058	0.018
Maximum value	0.196	0.080
Minimum value	0	

COPPER (Cu)	Pre-monsoon *Samples*	Post-monsoon *Samples*
Concentration (mg/I)	Control	Controi
Total	0.509	1.465
Average	0.084	0.244
Standard Deviation	0.085	0.324
Maximum value	0.213	0.900
Minimum value	0	0
	Experimental	Experimental
Total	0.857	1.129
Average	0.047	0.062
Standard Deviation	0.100	0.049
Maximum value	0.420	0.180
Minimum value	0	0

LEAD (Pb)	Pre-monsoon Samples	Post-monsoon Samples
Concentration (mg/I)	Control	Control
Total	0	0
Average	0	0
Standard Deviation	0	0
Maximum value	0	0
Minimum value	0	0
	Experimental	Experimental
Total	0.040	0
Average	0.002	0
Standard Deviation	0.022	0
Maximum value	0	0
Minimum value	0.040	0

MOLYBDENUM (Mo)	Pre-monsoon Samples	Post-monsoon Samples
Concentration (mg/I)	Control	Control
Total	0	0
Average	0	0
Standard Deviation	0	0
Maximum value	0	0
Minimum value	0	0
	Experimental _	Experimental
Total		
Average	0.105444	0
Standard Deviation	0.160629	0
Maximum value	0.417	0
Minimum value	0	0

Titenium (Ti)	Pre-monsoon Samples	Post-monsoon Samples
Concentrati on (mg/I)	Control	Control
Total	0	0
Average	0	0
Standard Deviation	0	0
Maximum value	0	0
Minimum value	0	0
	Experimental	Experimental
Total	0	0
Average	0	0
Standard Deviation	–	–
Maximum value	–	–
Minimum value	–	–

ZINC (Zn)	Pre-monsoon Samples	Post-monsoon Samples
Concentration (mg/I)	Control	Control
Total	4.197	3.120
Average	0.699	0.624
Standard Deviation	0.379	0.306
Maximum value	1.066	0.820
Minimum value	0	0
	Experimental	Experimental
Total	25.435	14.300
Average	1.413	0.841
Standard Deviation	1.279	0.648
Maximum value	4.410	2.500
Minimum value	0.006	0.100

7.5 Phthalates in Water Samples

The quality of water collected from dumpsite area was assessed with respect to phthalates. This was conducted to estimate the concentration level of phthalates viz. Di-methyl phthalate (DMP), Di-ethyl phthalate (DEP), Di-butyl phthalate (DBP), Di (2-ethylhexyl) phthalate (DEHP) and Di-octyl phthalate (DOP). The levels of different type of phthalates in the dumpsite water as well as control water samples at selected identified locations are presented in Table 4. During conducting experiment, Limit of Quantification (LOQ) and Limit of Detection (LOD) and recovery were determined by spiked sample method. The data analysed are presented at **Table 6.**

Table - 6

Compound	Spiked Level in water (Ogil)	Mean Recovery	LOQ (0g/1)	LOD (DWl)
DMP	10	70%	1.67	0.55
DEP	10	90%	0.28	0.09
DBP	10	76%	0.34	0.11
DEHP	10	85%	0.83	0.27
DOP	10	75%	0.40	0.13

The processed samples were analyzed using High Performance/Pressure Liquid Chromatography (HPLC). One representative chromatograph of Standard and a sample is presented in **Fig.6.** The five representative samples were analyzed on Gas Chromatography-Mass Spectrophotometer (GC-MS) to get confirmation of the respective chromatographic peaks of phthalates. The identification of the phthalates found in the samples was confirmed on GC-MS by comparing the RT and fragmentation patterns of the compound in the standard and samples.

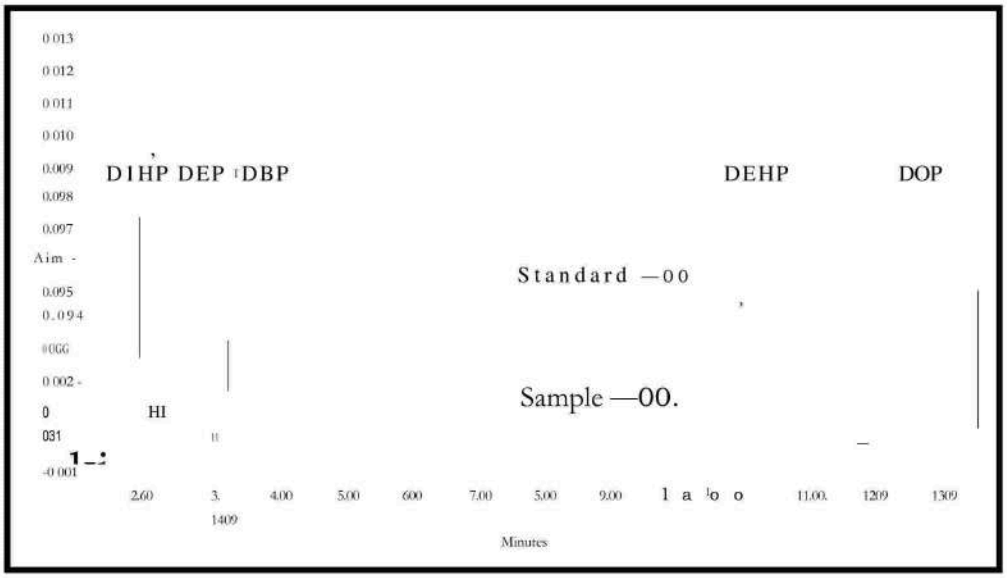
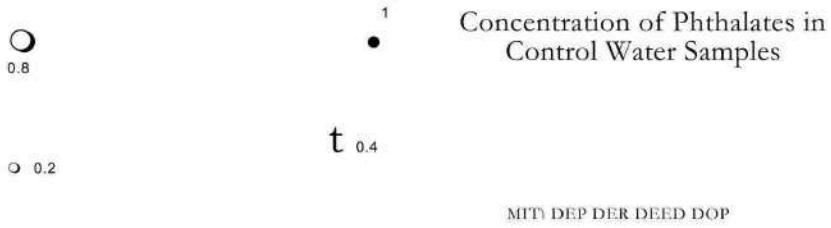


Fig-6: HPLC Chromatograph of representative Phthalate(s)

It is evident from the data of control water samples of all six locations that the values of phthalates are in traces **(Table 7)**. In **pre-monsoon control** water samples the mean values of individual phthalates are BDL, 0.958 mg/l, 0.747 mg/l, 1.005 mg/l and 0.462 mg/l for DMP, DEP, DBP, DEHP and DOP, respectively. These values revealed that DEHP were found to be present in 52.0% of the total phthalate concentration, while the DMP was the least detected phthalate. Detected phthalate concentration was found in the order DEHP>DEP>DBP>DOP»DMP, hence, it found in lesser quantity as compared to DEHP, DEP and DBP. **Data obtained from** the analysis **of post-monsoon control** water samples revealed the occurrence of **phthalates concentration is** comparatively higher than the **pre-monsoon samples (Fig. 7 and Fig. 8).** Mean values of individual phthalates concentration in post-monsoon control water samples are BDL, 1.033 mg/l, 0.832 mg/l, 1.358 mg/l and 0.517 mg/l for DMP, DEP, DBP, DEHP and DOP, respectively. Detected phthalate level was found to follow the same occurrence trend as pre-monsoon samples: DEHP> DEP>DBP>DOP>>DMP. Out of six control water samples, five samples were collected near (within 200 meters residential area) Dudauli and Ghaila Municipal waste dumpsite area from tube well or hand pump, which was used by local people. The presence of traces of phthalates in water samples of the dumpsite areas indicate the effect of dumping of municipal and plastic waste on the surroundings.

Fig 7: Mean Concentration of Phthalates (mg/l) in Control Water Samples



Control Water Samples	Mean Concentrat'on **(±SD)** of **Phthalates (mg/l)**				
	DMP	DEP	DBP	DEHP	DOP
Pre-monsoon	BDL	0·958 ±2.76	0.747 ±2.12	1.005 ±2.46	0.462 ±1.35
Post-monsoon	BDL	1·033 ±2.95	0.832 t2.37	1.358 ±3.45	0.517 ±1.51

Table 7: Concentration of Phthalates in Experimental Water Samples

Sampling Location	**Season**	**Mean** Concentration (±SD) **of Phthalates** (in **mg/l**)				
		DMP	DEP	**DBP**	**DEHP**	DOP
Point 1	Pre-monsoon	0.014 ±0.005	0.073 ±0.014	0.003 ±0.005	0.003 ±0.002	0.002 ±0.002
	Post-monsoon	0.036 ±0.012	0.081 ±0.010	0.017 ±0.029	0.012 ±0.013	BDL
Point 2	Pre-monsoon	0.009 ±0.001	0.105 ±0.013	0.009 ±0.005	0.009 ±0.001	BDL
	Post-monsoon	0.021 ±0.010	0.131 ±0.013	0.030 ±0.010	0.053 ±0.033	BDL
Point 3	Pre-monsoon	0.027 ±0.006	0.084 ±0.012	0.011 ±0.004	0.011 ±0.004	0.003 ±0.003
	Post-monsoon	0.038 ±0.007	0.121 ±0.024	0.038 ±0.005	0.007 ±0.005	BDL
Point 4	Pre-monsoon	0.016 ±0.006	0.058 ±0.053	0.006 ±0.002	0.009 ±0.001	BDL
	Post-monsoon	0.034 ±0.008	0.076 ±0.064	BDL	0.031 ±0.010	BDL
Point 5	Pre-monsoon	0.041 ±0. 006	0.085 ±0.015	0.040 ±0.005	0.069 ±0.019	0.003 ±0.005
	Post-monsoon	0.017 ±0.028	0.036 ±0.063	BDL	0.038 ±0.040	BDL
Point 6	Pre-monsoon	0.050 ±0.005	0.0683 ±0.010	0.038 ±0.008	0.067 ±0.007	0.006 ±0.010
	Post-monsoon	0.045 ±0.039	0.079 ±0.071	0.037 ±0.032	0.121 ±0.022	BDL

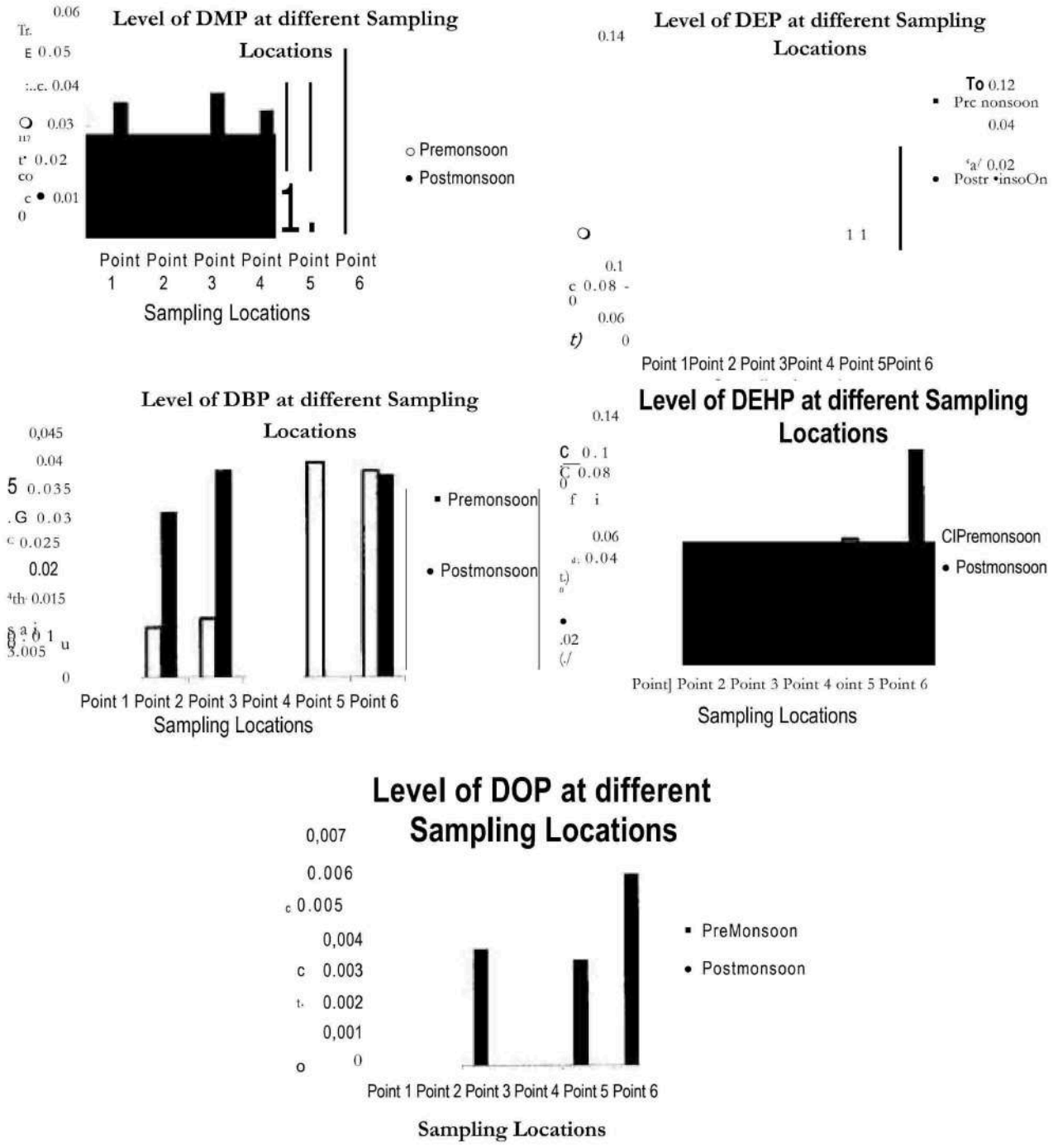


Fig 8: Mean Concentration of Phthalates (mg/I) in Experimental Water Samples

Conclusion:

- Characterization of dumpsite samples could be a yard-stick for the measurement of extent of pollution in surrounding environment. The biotic and abiotic transformation processes of different wastes give rise to pools of organic and inorganic compounds in the gaseous and liquid phases. During landfill operation, leachates are produced, mainly due to the infiltration of rainwater through the refuse tips. Such compounds may percolate through soil and contaminate groundwater basins in the drainage area of the landfill.
- The period of waste dumping (age of landfill site), geological and seasonal factors are important parameters to characterize the leachate and predict the environmental implications of waste dumping.
- The pH of dumpsite soil samples collected in post-monsoon season was found to be comparatively more basic than the pre-monsoon samples. Accumulated dumped waste containing high plastic contents as well as hard soil profile of low infiltration capacity caused water logging. This irrigated water contained much of the lime which might precipitate in the upper regions of dumpsite area and resulted into increase in the alkalinity of the soil.
- Availability of phosphorous and potassium was found to be higher in control soil samples than dumpsite samples indicating the depletion of nutritional quality of dumpsite soil due to dumping and degradation of plastics waste for more than 10 years.
- Decomposition of landfilled/dumped waste under environmental conditions caused higher concentration of nitrogen and chloride ions throughout the soil profile of dumpsite area.
- Presence of heavy metals and phthalates in first strata of underground water of umpsite area is due to migration and percolation of dumping of municipal and plastic waste.
- Data obtained from Toxicity Characteristic Leaching Procedure (TCLP) of dumpsite samples also contained significant amount of analytes indicating migration of chemical moieties from plastic waste.

Recommendation:

It has been observed that dumping of plastic waste may deteriorates soil and underground water quality due to leaching of additives, colours, stabilizes and fillers present in the different categories of plastic products. It is therefore recommended that plastic dumping should not be allowed to preserve the soil and water quality vis-as-vis Environment.

Annexure-IV

13

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL,

Principal Bench, New Delhi

Original Application No. 251/2022

In re: News item published in The Hindu dated 29.03.2022 titled "Detecting microplastics in human blood"

Index

(Divya Sinha)
Scientist E
Central Pollution Control Board
Delhi-110032

Date: 10.02.2023
Place: Delhi

14

CENTRAL POLLUTION CONTROL BOARD
DELHI

Date: 08.02.2023

Report in the matter of Tribunal on its own motion SuoMotu based on the news item published The Hindu titled "Detecting Microplastics in human blood" dated March 29, 2022 (O.A. No. 251/2022)

A. BACKGROUND

Vide order dated 05.04.2022 in aforesaid matter, Hon'ble NGT issued the following directions

Para4: *There is need for further studies, considering the studies already conducted, to be steered by the Committee comprising of CPCB, ICMR, Central Institute of Petrochemicals Engineering & Technology (CIPET), NCSCM, and any other expert institutions as required, under the Nodal coordination of CPCB. Such studies and recommendations/ suggestionsmay cover standards for safe environment, remedial steps to reduce menace of micro plastic and addressing other incidental issues. CPCB may incur expenditure on studies and other incidents out of Environmental Compensation funds*

B. ACTION TAKEN REPORT

Three meetings of the Committee members representingCPCB, *ICMR, CIPET&, NCSCM*were held on April 19, July 27 & August 5, 2022 respectively through Video Conferencing.Issues related to microplastics were discussed during the Meetings. The Minutes of the Meetings are enclosed at Annexure I. Detailed assessment of the work done by individual organization as well as available information on Microplastics has been completed and the outcome of the same is enumerated below:

1.0 About Microplastics

Microplastics is used extensively to describe plastic particles with an upper size limit of 5 mm (UNEP). Occurrence of microplastics has been reported from oceans, sediments, surface water, ground water, wastewater, tap water, bottled water, air, food products, aquatic organisms, and human (Microplstics in Drinking Water WHO 2019). Based on their origin; microplastics can be categorized into primary and secondary microplastics. Primary microplastics are intentionally manufactured in size < 5 mm to be used in various applications such as cosmetics, clothing and other textiles, fishing nets, etc. (Mai et al.

2018). Secondary microplastics originate from the breakdown of discarded plastic waste by solar radiation, mechanical degradation, microbial action etc. (Rodrigues et al. 2018; Wagner and Lambert 2018).

These microplastic particles may be of various shapes such as fragments, pellets, beads, and fibres. (Figure1.1). Further classification of microplastics on the type of plastic and its density is given in Table 1.1

Figure 1.1: Micrographs showing different types of microplastics: (a&b) fragments, (c&d) fibre/line, (e&f) film (g) foam and (h) pellet.

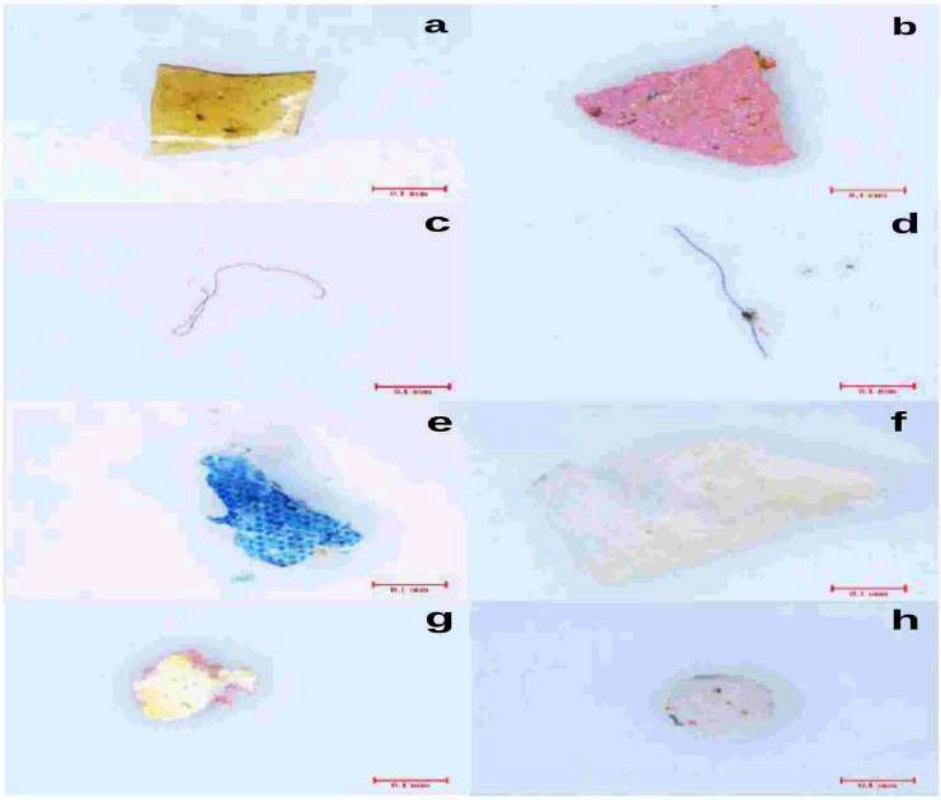


Table 1.1: Type & Density of Microplastics

Common Polymers of Microplastics	Common applications	Specific Gravity	
Polyethylene (PE)	Plastic bags, six-pack rings,	0.91-0.94	Floating

	gear	
Polypropylene (PP)	Rope, bottle caps, gear, strapping	0.90-0.92
Polystyrene (expanded) (PS)	Bait boxes, floats, cups	0.01-1.05
Seawater		~1.02
Polystyrene (PS)	Utensils, containers	1.04-1.09
Polyvinyl Chloride (PVC)	Film, pipe, containers	1.16-1.30
Polyamide or nylon	Gear, rope	1.13-1.15
Polyethylene terephthalate (PET)	Bottles, strapping, gear	1.34-1.39
Polyester resin + glass fibres	Textiles	>1.35
Cellulose acetate	Cigarette filters	1.22-1.24

Sinking

2.0 Sampling & Analysis of Microplastics

There is currently no standard method for sampling and analysis of microplastics in the environment. ISO is currently working on the subject (WHO Report :Microplastics in Drinking Water: 2019)

Sampling and analysis of microplastics, based on available literature, involves the following three steps:

a) Sampling;
b) Sample extraction and isolation &
c) Identification, characterization and quantification

2.1 Sampling

Microplastic samples can be acquired using trawl nets drawn across the surface of the water, or through collection of water samples from which the particles are extracted later.

2.2 Sample Extraction

Sample purification usually involves filtration, followed by some sort of extraction process such as density separation, in which samples are mixed with a liquid of defined density, allowing microplastic particles to float and heavier particles to sink. Further purification may require chemical or enzymatic methods to remove organic or inorganic contaminants (biofouling). The extent of the preparation is dependent on the nature of the samples: dirtier samples will require more preparation.

2.3 Analysis

2.3.1 Count of Microplastics

The simplest and the most common technique to quantify the microplasticsparticles is the optical microscopy where quantification is achieved through manual counting.Though this technique is simple, it poses limitations in terms of misidentification and reduced accuracy (underestimation (Loder et al. 2015) / overestimation (Lenz et al. 2015)). However,application of electron microscopic techniques, such as scanning electron microscopy can overcome this limitation up to some extent (Eriksen et al. 2013)

2.3.2 Chemical Composition

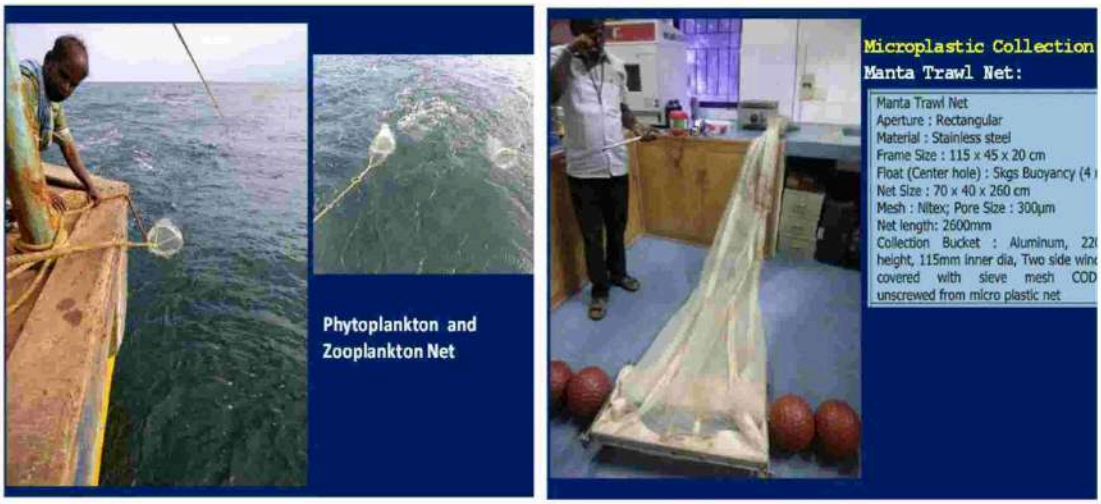
Two different approaches are available to determine the chemical composition: spectroscopic&thermoanalytical.

- **Spectroscopic methods**: Used to identify the specific chemical structure of polymers by comparing their absorption or emission spectra with reference spectra. Fourier transform infrared spectroscopy (micro FTIR) Fourier transform infrared spectroscopy and Raman spectroscopy are utilized for this purpose.
- **Thermo-analytical methods**, the sample ispyrolysed under inert conditions, so that specific decomposition products of the individual polymers can be analyzed. Pyrolysis-gas chromatography/mass spectrometry (GC/MS) can provide information on additives as well as the polymer

2.4. Sampling & Analysis Methods followed in India

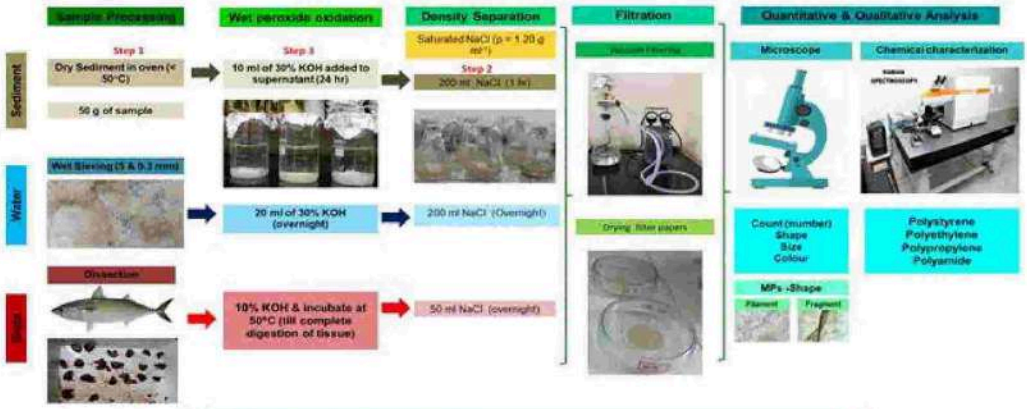
2.4.1 Ministry of Earth Sciences (National Center for Coastal Research (NCCR))

(a) Sampling Methods



(b) Sample Extraction & analysis

Laboratory Analytical Protocol



1. Wet oxidation (H_2O_2)
2. Density Separation (NaCl)
3. Filtration GF/F (0.7 µm)
4. Microscopic Analysis (count, shape, size, colour)
5. FT-IR/Raman: Chemical Analysis

2.4.2 CIPET

(a) Sample extraction techniques:

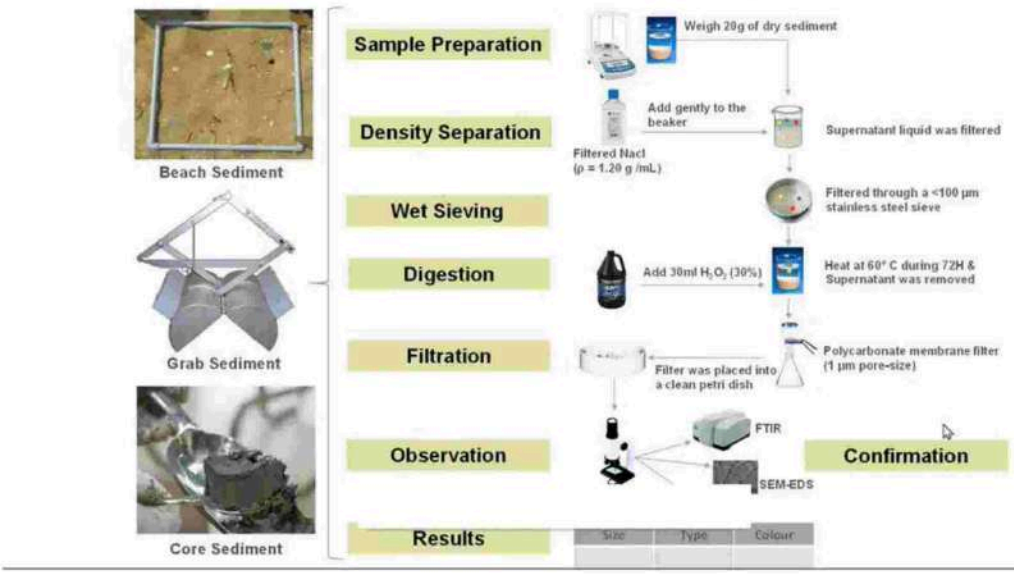
- Quality Control (Running blank samples)
- Preparation of salt solution:
- Density Separation
- Wet Peroxide Oxidation
- Sieving
- Vacuum Filtration

(b) Qualitative analysis:

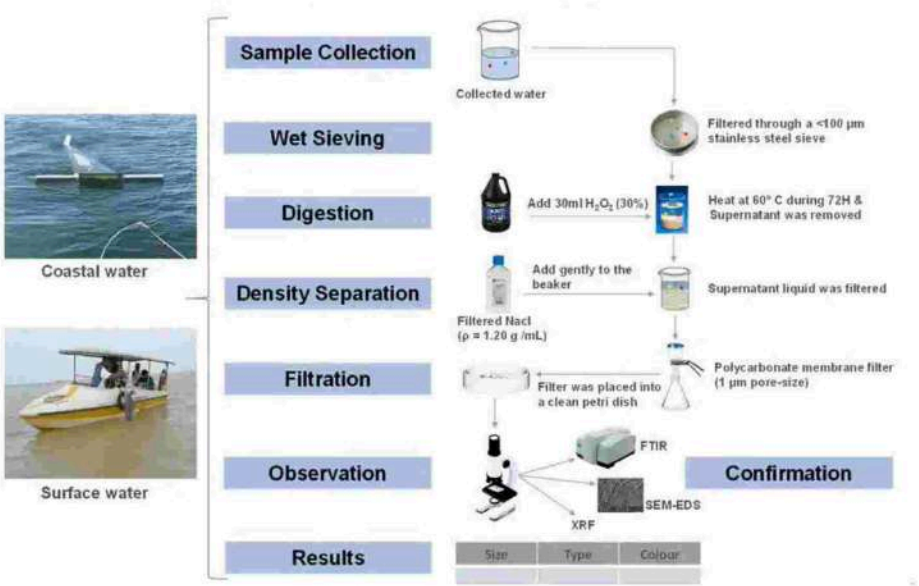
- Optical Microscope: The analysis is done through different magnification ranges i.e. 5x,10x and 20x to for various shape and sizes of microplastics.
- Micro-FTIR: In this technique, the spectra obtained by of targeted microplastics are analysed through the peaks obtained and analysing them through the functional group.
- Pyrolysis GC-MS: The thermal technique is used for the knowledge of degradation products of the microplastics found in the sample.
- Number of microplastic samples found in per litre of sample in each location was analysed along with various shapes and colours.

2.4.3 NCSCM

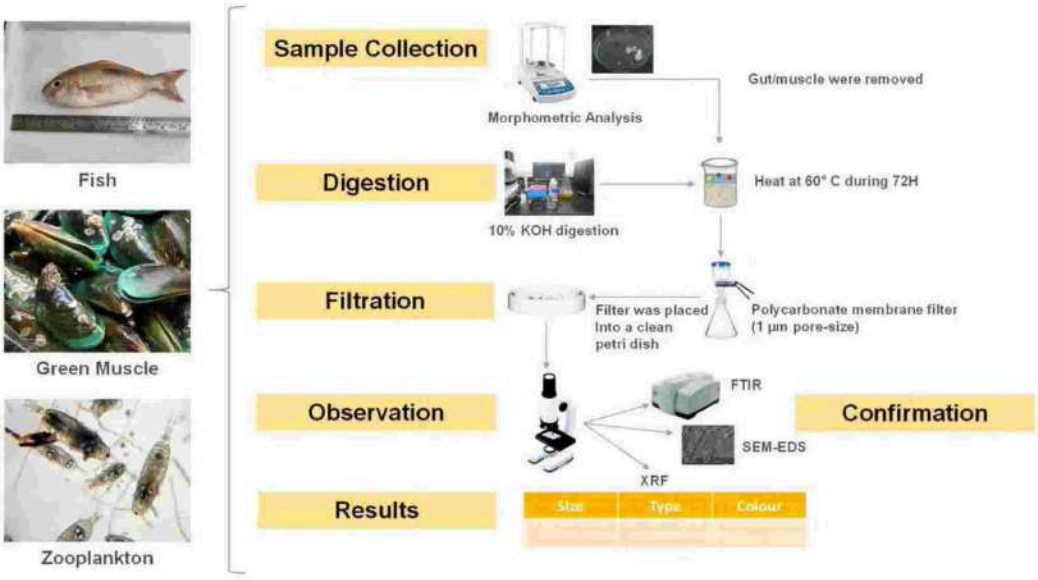
(a) Sample Extraction & analysis (Sediments)



(b) Microplastic Analysis in Water



a. Microplastics analysis in Biota



2.5 Observations

(a) Sampling and analytical methods adopted by different institutions in India are similar with minor variations

(b) Standard method for Sampling & Analysis developed by BIS/ISO is essential to formalize further action on monitoring reports.

3.0 Assessment of Microplastics

21

Microplastics (both primary and secondary) pollute drinking water sources primarily through discharge of sewage/wastewater treatment plant effluent and surface run-off. There are large numbers of industries that use (primary) microplastics for various applications, such as medicines, cosmetics etc. After their use, these primary microplastics get washed off and become a part of the domestic wastewater (Singh et al. 2021). As the sewage/wastewater treatment plants are not equipped for the complete removal of microplastics, the effluent released from these plants contains substantial quantity of microplastics (Amrutha and Warrier 2020). Upon mixing of this effluent with the freshwater sources, microplastics become part of the fresh/drinking water supply chain (Magnusson and Noren 2014; Novotna et al. 2019). It is also important to note that many components of water treatment plants and water distribution system are usually made up of plastic materials, such as high density polyethylene, polyvinyl chloride, polypropylene etc. (Mintenig et al. 2019) and hence, these further contribute towards microplastic generation in the water they carry.The treated bottled water is also reported to contain microplastics (Mason et al. 2018;Pivokonsky et al. 2018). Nevertheless, the smallest microplastic particle reported in case of drinking water is 1 µm (WHO 2019). Evidence suggests that it is the bottling process and/or packaging of the plastic bottles/caps that largely contributes to the generation of microplastics.

In the air, suspended microplastic particles have been isolated from various places, such as, urbanized city centres, indoor households, and remote outdoor regions. As there is wide range of microplastics' size, it is highly likely that these particles are inhaled by the humans (Jenner et al. 2022).

Soil can get affected from plastics through various means such as plastic mulch films, municipal so waste, sewage sludge, fertilizers coated with plastics etc. (McCormick et al.2014; Blasing and Amelung 2018; Liu et al. 2018). A significant positive correlation has been seen between the rate of sludge applied onto the soil and concentration of microplastic particles in the soil (Zhang et al. 2020).

Various organizations including CIPET, NCSCM, NCCR (MoES), NPC & CPCB have conducted microplsatic monitoring. Further international organization including UNEP, WHO and OECD have worked extensively on Microplastics and published comprehensive Reports. Based on aforementioned Sources of generation of microplastics, transfer media and end use areas have been identified. Further details of microplastics(concentration, type etc) for these areas have been compiled. Details are given in Table 3.1

Table 3.1 : Sources of Generation &Analysis& of Microplastics

S.N.	Class	Category	Subcategory	Description	Analysis data	Reference
1.	**Generation**					

22

S.N.	Class	Category	Subcategory	Description	Analysis data	Reference
	of Microplastics					
a	Industry	(i)During production	Toothpaste		NA	UNEP
			Cosmetics	Microbeads in skin care	NA	UNEP
			Printer , ink, spray, injection moulding		NA	UNEP
			Plastic production	Emissions/ spillages	NA	UNEP
			Ship breaking		NA	UNEP
			Cigarette filters		NA	UNEP
		(ii)During Usage	Synthetic textiles	Use & washing	100 microfibers/L	UNEP,OECD
			Horticulture	Plastic Sheeting / Tube	NA	UNEP
			Road Transport	Tyre & Road wear particles	NA	OECD, WHO
			Paint from Building & Ships		NA	OECD
			Bottled Water	Caps & bottle	Section 3.1	WHO
			Synthetic Soles of Shoes		NA	WHO
b	Improper waste management	(i) Land Litter		Degradation under specific temp & UV rays	NA	UNEP, WHO
		(ii)Dumpsites		Degradation under specific temp & UV rays	NA	UNEP, WHO

S.N.	Class	Category	Subcategory	Description	Analysis data	Reference
		(iii)Marine litter		Degradation under specific temp & UV rays	NA	UNEP
c	Ocean Activities			Fishing Nets, Boxes, Rope, galley waste;	NA	UNEP, MoES
				Aquacuture - nets, floating	NA	UNEP
				Coastal Tourism	NA	UNEP NCSCM
				Offshore Oil & Gas Platform	NA	UNEP
d	Outflow from sewage treatment plant			Waste water treatment plant can effectively remove microplastics , but in most area adequate sewage treatment systems not provided	NA	WHO
e	Agricultural Runoff			When waste water sludge is used as compost	NA	WHO
f	Stormwater drains			Carrying Road dust	NA	WHO
g	Leachate			Leachate	Section 3.2	CPCB
2	**Transfer of Microplastics**					
a	Surface Water				Section 3.3	CPCB, NPC
b	Soil / Beach Sediment				Section 3.4	MoES, NCSCM
c	Sludge				NA	
d	Fish				Section 3.5	MoES **NCSCM**
e	Ocean				Section	MoES,

S.N.	Class	Category	Subcategory	Description	Analysis data	Reference
	water				3.6	NCSCM
3	**End use**					
a	Ground Water				Section 3.7	CPCB. WHO
b	Drinking Water			Microplastics have been identified in drinking-water as small as 1 µm, based on the smallest particle size detected by current methods. Large particles occur less frequently than small particles. The predominant particle shapes are fragments and fibres. The predominant plastic types are PET and PP	Table 3.1	WHO
c	Ambient Air			Tyre & Road wear dust	Section 3.8	WHO, CPCB

3.1: Drinking Water & Bottled Water

(a) WHO

Table 3.2 : MP comncentration in Tap Water / Bottled Water

Author	Water type	Lower size bound (µm)	Particles/L in sample (average)	Particles/L in blanks (average)
Oßmann et al.	Bottles (mineral water)	1	3074-6292	384

	•Glass •Single use PET •Reusable PET		2649 4889	
Pivokonsky et al. (2018)	DWTP from surface water sources (3 sites	1	628 338 369	<5% of counts in samples
Schymanski et al. (2018)	Bottles •Single use •Returnable •Glass •Beverage carton	5-20	 14 118 50 11	14±13
Mason, Welch and Neratko (2018)	Bottled	6.5-100 Lower bound based on microscope and software	315	23.5
Strand et al. (2018)	Tap from ground-water sources	10-100	0.2, 0.8 and 0.0 (LoD = 0.3)[4]	Unknown
Mintenig et al. (2019)	Tap from ground-water sources.	20	0.0007	0.67 particles/L 0.3 fibres/L
Uhl, Eftekhardadkhah, and Svendsen (2018)	Tap from 24 sources	60	Average not reported since only a single result above LoQ (that result was 5.5)	0.5 (LoQ = 4.1 LoD= 0.9)
Mason, Welch and Neratko (2018)	Bottled	>100	10.4	4.15
Strand et al. (2018)	Tap from ground-water sources	>100 (10 µm sieve size)	0.312 (LoD = 0.58)	0.26
Kosuth, Mason and Wattenberg (2018)	Tap from unspecified sources	100 lowest reported	5.45	0.33 (based on 5 particles in 30 blanks (ea. 500mL))

3.2 Leachate from Dumpsite

Table 3.3. : Leachate (CPCB)

Location	Type of water	Microplastics concentration (particles/ L)	Reference
South China	Leachate	3 to 25 particles/L	Wan et al. 2022
Suzhou, China	Leachate	235.4 ± 17.1 particles /L	Sun et al. 2021
China	Leachate	0.42 to 24.58 particles/L	He et al. 2019
Shanghai, China	Leachate	4 ± 13 particles/L	Su et al. 2019
Lahti, Finland	Leachate	1.97 particles/L	Praaghet al. 2018
Alfsnes, Iceland	Leachate	4.51 particles/L	Praaghet al. 2018
Kodungaiyur, India	Leachate	0.75 to 16.2 particles/L	CPCB
Perungudi, India	Leachate	0.8 to 32 particles/L	CPCB

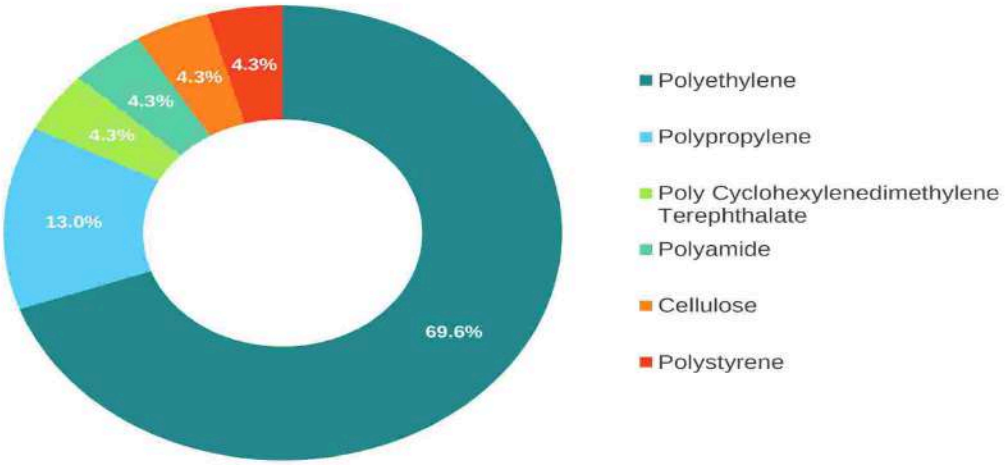


Figure 3.1 : Percentage composition of different types of plastics found in Leachate (CPCB)

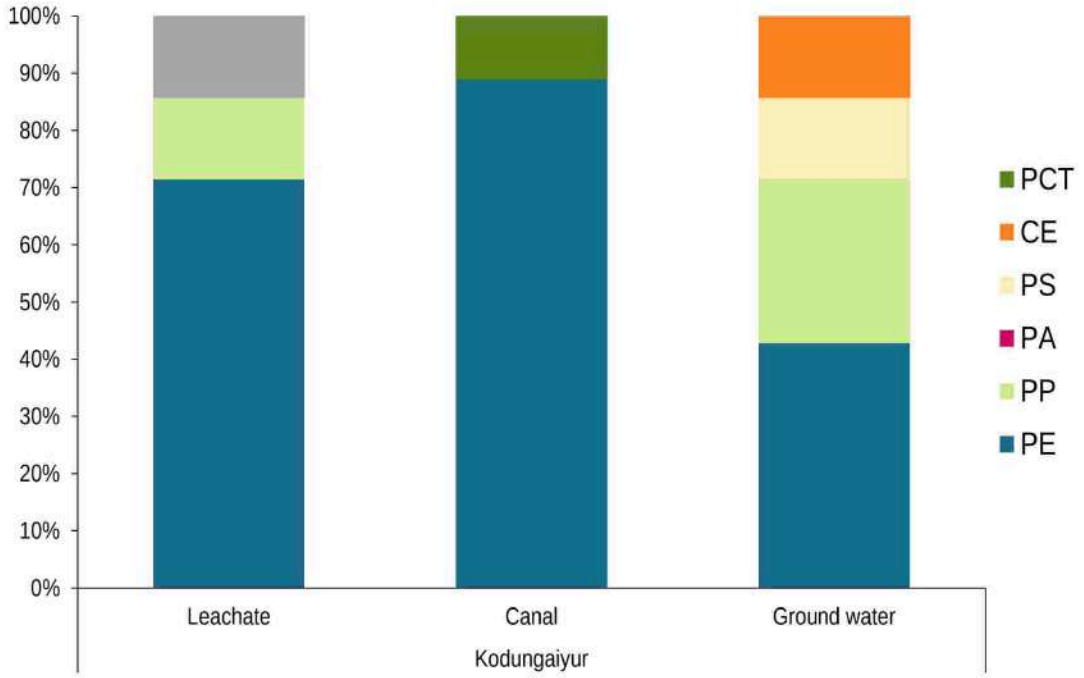


Figure 3.2: Percentage composition of microplastics in leachate, canal and groundwater samples around in dumpsite (CPCB)

3.3 Surface water

Table 3.4 Microplastics in Surface Water (WHO)

Location	Results reported (particles/L)	Sieve size (µm)	Study
Groundwater, Germany	Average:[b]0.7×10^{-3} Range:[b]$0\text{-}7\times10^{-3}$	3	Minteniget al. 2019
Three Gorges Reservoir, China	Average: 4.7 Range: 1.6 – 12.6	48	Di and Wang, 2018
Dongting Lake and Hong Lake, China	Averages: 1.2 and 2.3 Ranges: 0.9-2.8 and 1.3-4.7	50	Wang et al. 2018
Wuhan, China	Range: 1.6-8.9	50	Wang et al. 2017
Rhine river, Switzerland, France, Germany, Netherlands	Average: 0.0056	300	Mani et al. 2015
Western Lake Superior, USA	Average: 0.00026	333	Hendrickson, Minor, and Schreiner, 2018

Figure 3.3 Microplastics identified in the River
(Sizes of Plastic like Particles in Water Samples in percentage in four cities)(NPC)

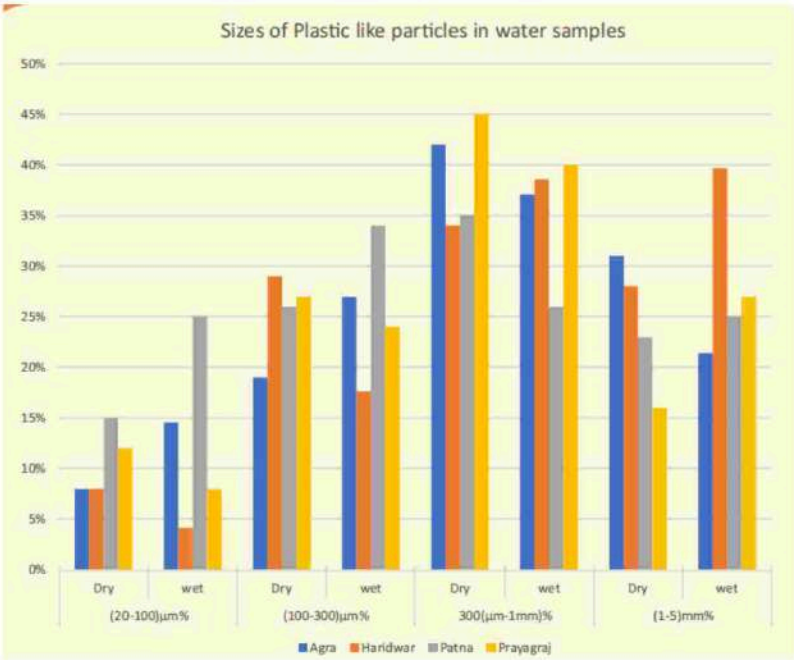
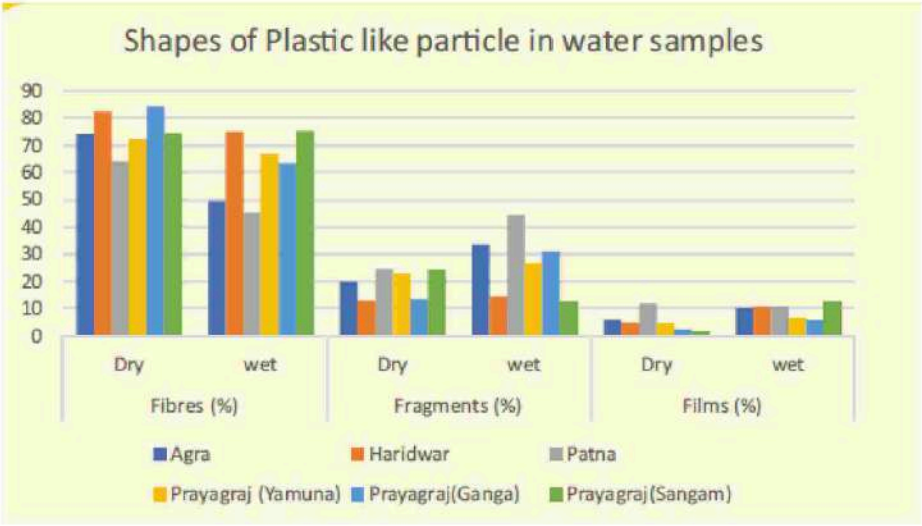
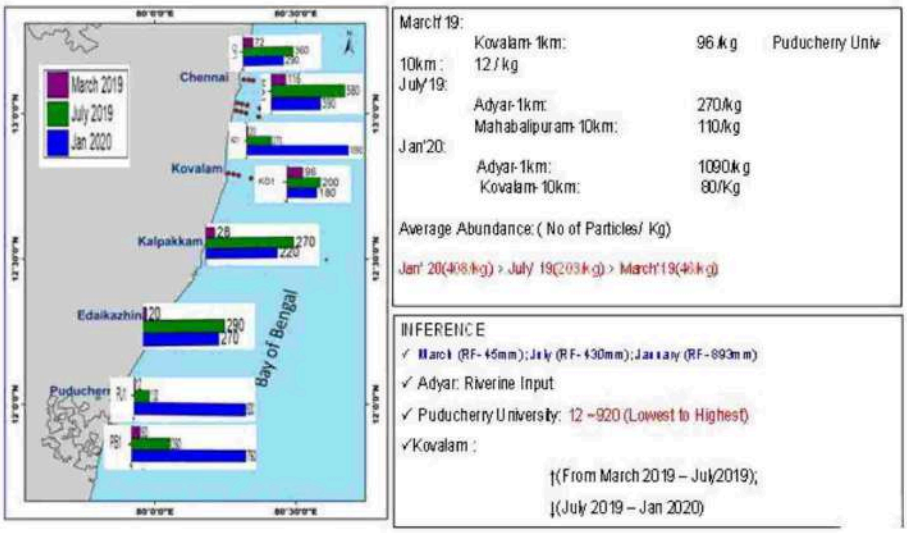


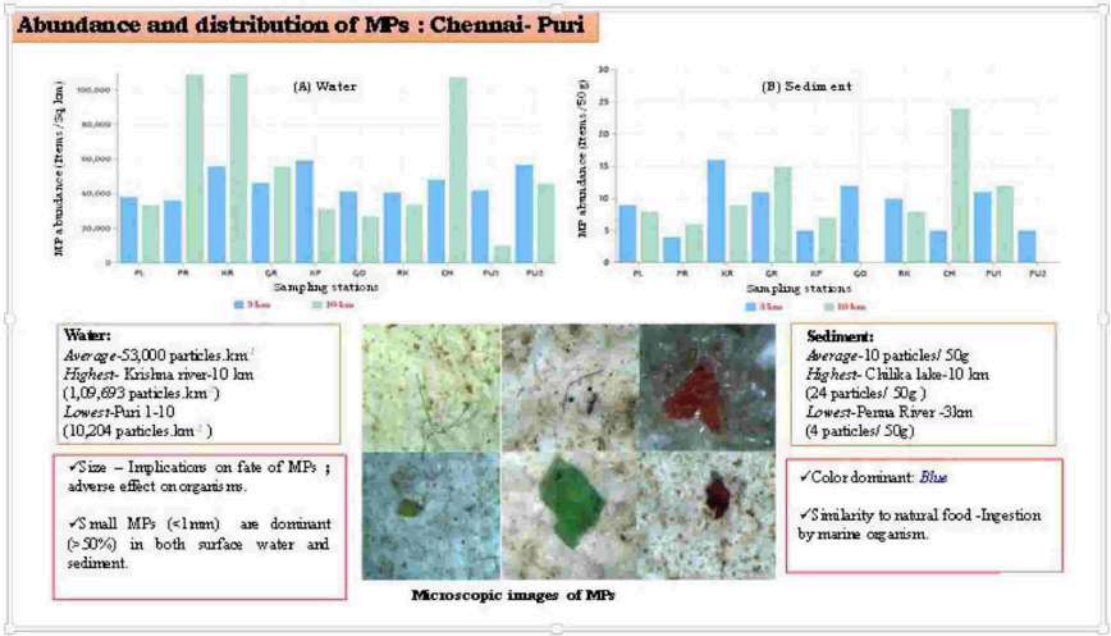
Figure 3.4 Microplastics identified in the River
(Shapes of Plastic like Particles in Water Samples amongst Fibres/Fragments/Films in percentage in four cities) (NPC)



Section 3.4 :Beach Sediment/ Deep Sea Sediments
(a) Figure3.5 Microplastics (MoES- NCCR)
(Microplastic sediments –Chennai-Puducherry)



(b) Figure3.6Microplastics (MoES- NCCR)
(Microplastic sediments –Chennai-Puri)



(c) Beach sediments (NCSCM)

Abundance of microplastics in terms of numbers of particles and their range, in the beach sample reported from different parts of the world and long the Tamil Nadu coast () Table 3.5

30

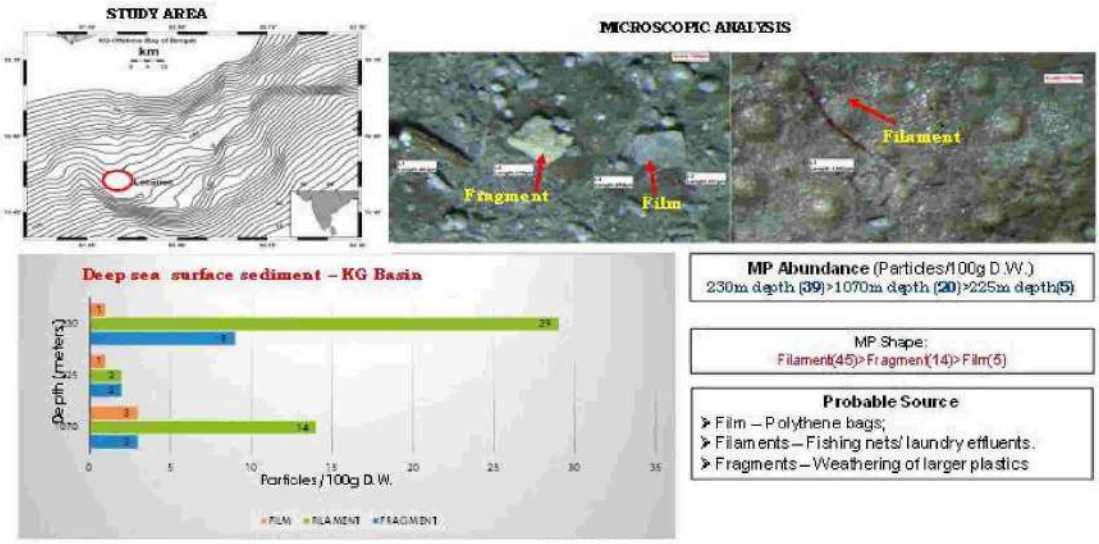
S.No.	Location	Range	Mean ±	Reference

31

1.	Charleston, Harbor, USA	42 to 1196/m^2	413.8 ± 76.7/ m^2	Grayet al. 2018
2.	Winyah Bay, USA	51 to 441/m^2	221.0 ± 25.6/ m^2	Grayet al. 2018
3.	Guanbara Bay, Brazil	12 to 1300/m^2	-	Carvalho and BaptistaNeto , 2016
4.	Bostanu, Persian Gulf	-	1258 ± 291/kg	Najiet al. 2016
5.	Gorsozan, Persian Gulf	-	122 ± 23/kg	Najiet al. 2016
6.	Norther Gulf on Mexico	-	50.6 ± 9.96/ m^2	Wessel et al.2016
7.	South Korea	2 to 92,217/m^2	8205/m^2	Lee et al. 2013
8.	Chile	1 to 169/m^2	30 ± 2.6/m^2	Hidalgo-Ruz and Thiel, 2013
9.	Easter Island	-	800 ± 320/m^2	Hidalgo-Ruz and Thiel, 2013
10.	South Korea	-	976 ± 405/m^2	Heoet al. 2013
11.	Mumbai, India	12 to 960/m^2	68.8/m^2	Jayasiriet al. 2013
12.	Otzias beach, Eastern Mediterranean	20 to 1218/m^2	575/m^2	Kaberiet al. 2013
13.	Portugal coast	1 to 137/m^2	26.6 ± 32.5/m^2	Martins and Sobral, 2011
14.	Malta, Central Mediterranean	0 to 1462/m^2	33.3/m^2	Martins and Sobral, 2011
15.	Belgium	-	91.9/kg	Claessenset al. 2011
16.	Hawaiian Archipelago	4 to 17,645/m^2	-	McDermid and McMullen, 2004
17.	Tamil Nadu Coast, India	2 to 178/m^2	46.6 ± 37.2/m^2	R. Karthik et al.

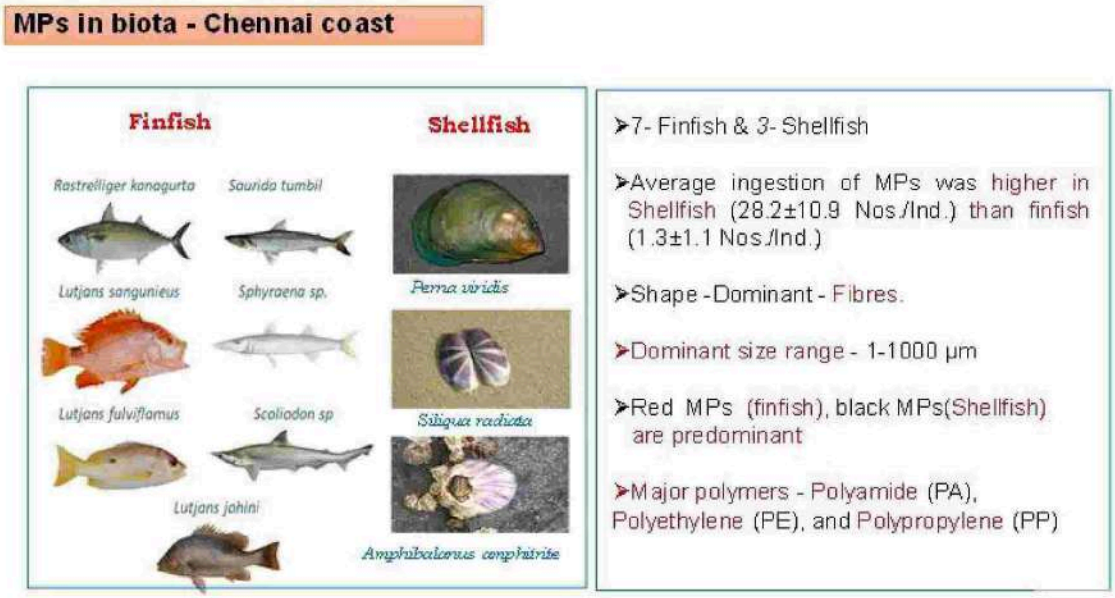
Figure 3.7 Deep Sea MicroplasticConcentration (MoES)

Deep Sea Sediment - Microplastics



Section 3.5 Microplastics in Fish

Figure 3.8Microplastics in Biota (MoES)



Section 3.6 Coastal Water

Abundance ranged between 0.22 and 3.58 particles/m3 with an average of 1.25 ± 0.88 particles/m3 (n = 14) (NCSCM).

Figure 3.9Microplastics in Coastal Water (Global distribution of mean microplastic particles (particles/m') in the coastal waters and comparison)

Section 3.7 Microplastics in Groundwater

Table 3.6:Microplastics in Groundwater (CPCB)

Location	Type of water	Microplastics concentration (particles/ L)	Reference
South China	Leachate	3 to 25 particles/L	Wan et al. 2022
Suzhou, China	Leachate	235.4 ± 17.1 particles /L	Sun et al. 2021
China	Leachate	0.42 to 24.58 particles/L	He et al. 2019
Shanghai, China	Leachate	4 ± 13 particles/L	Su et al. 2019
Lahti, Finland	Leachate	1.97 particles/L	Praaghet al. 2018
Alfsnes, Iceland	Leachate	4.51 particles/L	Praaghet al. 2018
Kodungaiyur, India	Leachate	0.75 to 16.2 particles/L	CPCB study 2022
Perungudi, India	Leachate	0.8 to 32 particles/L	CPCB study 2022
South China	Groundwater	11 to 17 particles/L	Wan et al. 2022
Australia	Groundwater	16 to 97 particles/L	Samandraet al. 2022
Karst, US	Groundwater	15.2 particles/L	Pannoet al. 2019
Kodungaiyur, India	Groundwater	0.87 particles/L	CPCB study 2022
Perungudi, India	Groundwater	2.1 particles/L	CPCB study 2022

Section 3.8 Microplastics in Ambient Air

Table 3.7: Microplastics concentrations detected in the air at Dumpsites in India vsMicroplastics measured at different locations across the globe(CPCB)

Location	Samples Type	Method	Microplastics conc. (particles/m^3)	Reference
Shanghai, China	Urban megacity	KB-120F type intelligent middle flow total suspended particulate sampler	0–4.18	Liu et al. 2019a
Paris, France	Indoor and outdoor of Residential area of Paris city	Simple vacuum filtration array	0.3–1.5	Driset al. 2017
Asaluyeh County, Iran	Industrial area	ECHO PM ambient filter sampler	0.3–1.1	Abbasiet al. 2019
West Pacific Ocean	Coastal area	KB-120F type intelligent middle flow total suspended particulate sampler	0.13 ± 0.24	Liu et al. 2019a
Cal State University, USA	Across 100 km of coastal Southern California, Semi-urbanized landscape	Simple vacuum filtration array	0.7–19.6	Gaston et al. 2020
Kodungaiyur, Chennai, India	Urban area,landfill site	High Volume Air Sampler	0.37–0.92 (PM10) 0.50–0.97 (PM2.5)	CPCB study 2022
Perungudi, Chennai, India	Urban area, landfill site	High Volume Air Sampler	0.22–0.72 (PM10) 0.50–3.88 (PM2.5)	CPCB study 2022

3.9 Observations

- Quantification of Microplastic generation at source has not been done for most of the Sources
- Variation in Microplastic concentrations units reported by different organizations observed
- Most of the monitoring has been done in Coastal Areas

4.0 Risk Assessment

Microplastics can present several unique challenges for traditional human health risk assessment approaches. Findings of World Health Organization and ICMR are highlighted in this section

4.1 WHO

WHO in its report on Microplastics in Drinking water: WHO Report 2019" has highlighted the following issues

- Microplastics can present several unique challenges for traditional human health risk assessment approaches. Plastic polymers are generally considered to be of low toxicity. Being insoluble, they are unlikely to be absorbed from the gastrointestinal (GI) tract and generally do not interact with biological matrices, although particle size may influence absorption and toxicity (i.e. smaller particles may represent a greater hazard). However, plastics can contain additives and unbound monomers, which may leach out either into the surrounding water environment prior to human consumption or potentially, into the GI tract to become bioavailable under some circumstances. Further, plastic particles can sorb chemicals from the environment, some of which are of toxicological concern.
- Investigation of potential risks related to particles indicate that it is possible that some smaller plastic particles may be able to pass through the gut wall and translocate to tissues remote from the mucosa, although this may not necessarily translate to a health risk. Humans have always ingested particles and have ingested plastic particles for decades with no related indication of adverse health effects. In addition, a good deal of evidence suggests that microplastics pass through the GI tract into the faeces.
- There is currently a paucity of information to quantitatively assess any potential risk associated with exposure to microplastic particles Most toxicological tests of microplastics have focused on aquatic organisms or ecotoxicology. No epidemiological or human studies on ingested microplastics

have been identified. Data from studies on laboratory animals are scant and inadequate to confirm human health risk assessment of microplastics ingestion. **There are no studies on the impacts of ingested microplastics on human health and there are only a limited number of animal studies of questionable reliability and relevance**

- There is currently no evidence to suggest a human health risk from microplastic associated biofilms in drinking-water**.** The risks from pathogens in microplastic-associated biofilms is considered far lower than the well-established risk posed by the high concentrations and diversity of pathogens present in human and livestock waste, which often make their way into drinking-water sources with inadequate treatment
- **Routine monitoring of microplastics in drinking-water is not recommended at this time, as there is no evidence to indicate a human health concern**

4.2 **ICMR**

ICMR has informed that they have not carried out any study on impact of microplastics on human health so far. However, as per the study carried out so far, Microplastics have been reported in human saliva, blood, placenta , colon, stool and lungs. Overview of the findings of the study carried out on impact of Microplastics on human health , as reported by ICMR, is given below:

	No. of Studies	No. of Human Samples	MP Reported	Impact on Human Health
Blood	1	22	1.6 microgm/mL	Not reported
Placenta	1	6	12 particles in 4 out of 6 samples tested	Not reported
Lungs	2	13 (First Study)	0.69±0.85 gm/L of Lung tissue; 39 particles in 11/13 samples tested	Not reported
		20 (Second study)	37 particles in 13 out of 20 samples tested	Not reported
Stool	2	8 (First Study)	2 particles per gm of Stool	Not reported
		24 (Second study)	1-36 particles per gm of stool	Not reported
Saliva	1	2000	No. of sample in which MP reported: 650;	Not reported

			Avg. concentration: -0.33 MP/individual	
Genotoxic& cytotoxic effects of MP in Human blood	In-vitro	2	Size studied: 10-45 microm; Concentration – 25,50, 100, 250, 500 microg/L; Type:PE	Genomic instabilities were reported
Cytotoxic effect of MP with metal nano particles in human celebral& epithelial cells	In-vitro		Size studied: 3-16 microm; Concentration – 50 microg/L-10 mg/L; Type:PE&PS	Oxidative stress was reported

It was further informed by ICMR that studies are only about the presence of microplastics in human body and not about their physiological or psychological impact. Studies showing genotoxic& cytotoxic impacts are invitro studies conducted on only two individuals. Health impact of emerging contaminants are chronic and long term studies are required to establish Cause effect relationship. It would not be appropriate to set standards for drinking water for microplastics without establishing the cause-effect relationship

4.3 Observations

- Further studies are required understand the uptake and impact of microplastics on human health
- Influence of particle size, shape and chemical composition of microplastics to be studied in detail
  Studies are also required to assess the impact of associated chemicals & biofilm on human health

5. Remediation techniques:

5.1 Available technology for Microplastic removal

Microplastic treatment technologies are in the nascent stage. Removal methods in case of air and soil matrices have not been reported yet. Treatment technology options for microplastics in water include the

- Conventional Water treatment system: In the conventional water treatment technology, primary and secondary treatment processes help in the removal of microplastics 50 – 98% of microplastics could be removed during primary treatment and 0.2 – 14% during secondary treatment (Sun et al. 2019). Microplastic concentration can be significantly reduced by ultrafiltration and reverse osmosis (Ziajahromi et al. 2017). Combination of secondary and tertiary treatment processes has also been useful in the removal of microplastics.

- Microbial Degradation (Biodegradation): Environmental friendliness, cheap cost and low energy input, as well as a reduced carbon footprint, are all advantages of biodegradation. Plastics can be used by microorganisms as carbon and nitrogen sources, allowing them to survive and reproduce.

- Photodegradation/ Photocatalytic degradation: Photocatalytic degradation of typical microplastics can be carried out by UV light radiation and degradation for various sizes of microplastics will be studied.

5.2 Observations

- Available technologies for removal of microplastics need to be studied in detail to assess their efficacy
- Research studies to be conducted for removal of microplastics from air & soil

6.0 Initiatives taken to reduce Microplastics

- The Microbead-Free Waters Act has been notified inUS which prohibits the manufacture and distribution of nonprescription drugs that are also cosmetics and that contain plastic microbeads for the purposes of exfoliating or cleansing any part of the human body. Common examples of rinse-off nonprescription drugs that are also cosmetics include, but are not limited to, anti-cavity (fluoride) toothpastes, acne scrubs, anti-bacterial soaps, and anti-dandruff shampoos
- **BIS 2017 :** Plastic microbeads of diameter 5 mm or less, that are insoluble in water, and solid plastic particles used to exfoliate or cleanse in personal care products have been listed in the banned list
- **Plastic Waste Management (Second Amendment) Rules, 2022:**
  a. Banned all single-use plastics from 1st July 2022.
  b. mandate to increase the thickness of plastic carry bags to over 120 microns from December 31.
  c. Banned imports of solid plastic waste from March 2019

C. Conclusions

1. Independent studies regarding microplastics have been conducted by various organizations in the country including CPCB, MoES-NCCR, NCSCM, NPC and CIPET . Further international studies have been conducted by WHO, UNEP , OECD and others.
2. The studies have primarily focussed on monitoring microplastics (concentration, polymer type, colour, shape) in various environmental matrices.
3. Occurrence of microplastics has been reported in oceans, sediments, surface water, ground water, wastewater, tap water, bottled water, air, food products, aquatic organisms, and human beings
4. There is currently no standard method for sampling and analysis of microplastics in the environment. ISO is currently working on the subject
5. Sampling and analytical methods adopted by different institutions in India are similar with minor variations.Variation in Microplastic concentrations units reported by different organizations has been observed
6. Uniform procedure for sampling & analysis may be developed by organizations involved in microplastic analysis (CIPET, NCSCM, MoES-NCCR) which can be adopted uniformily across the country till the time ISO standard is finalized.
7. Source of generation of microplastics including industries, waste management , waste water treatment, ocean activities etc. have been identified. However, exact quantum of microplastics generated from the identified source has not been determined.
8. Microplastic concentration in transfer media is available for soil/beach sediment, surface water bodies, biota and ocean water. Microplastic concentration for sludge , specifically when it is converted to compost for land application is not available
9. Microplastic concentration in end use areas including ambient air, drinking water and ground water is available.
10. Source monitoring, transfer end use of all possible sources listed in Table 3.1 to be covered. Emphasis to be laid on such areas for which no information is available.
11. Regular monitoring of various water quality parameters to be conducted to provide insight into the presence and concentration of microplastics in environmental matrices(water, sediments, biota)
12. Microplastic leakages and pathways may be monitored in order to identify further sources and hotspots of microplastics.
13. Uniform procedure for sampling & analysis as finalized by this Committee may be adopted for such studies till the time ISO Standards are finalized

14. Studies conducted on the matter have reported about the presence of microplastics in human body. Physiological or psychological impact has not been reported in these studies.
15. Health impact of emerging contaminants and long term studies are required to establish Cause effect relationship of microplastics on human health
16. The aforementioned studies should cover different type, concentration and shapes of microplastics. Impact of chemicals /biofilms associated with Microplastics on human health to be covered. The studies may include the following:
    - Estimation of the duration and frequency of human exposure to microplastics. Microplastic monitoring as required may be conducted for the same
    - Once the exposure assessment is done precisely, dose-response assessment may be carried out, where the minimum concentration (of microplastics) responsible for any observable effect (on human) shall be assessed..

17. **Bioassays** may be conducetd to assess the Eco-toxicological impact of microplastics on animal life.
18. Standards development (Source & ambient) for microplastics may be taken up following establishment of the cause-effect relationship of microplastics on human health
19. Available technologies to be assessed for their efficacy for removal of microplastics.
20. Technologies to be developed for removal of microplastics from Air & Soil
21. **Source-directed interventions,**
    - Sustainable design and manufacturing of textiles, tyres, and complementary products (, laundry detergents, road surfaces, and vehicles), to minimise the tendency of products to contribute to microplastics generation;
    - Restrictions on microplastics in the manufacture and sale of certain personal care and cosmetic products containing microplastics.
    - Product requirements for household, commercial, or industrial washing machines. For instance, Australia and France have introduced measures to phase in microfibre filters on new washing machines

9. **End-of-life interventions,** effective solid & plastic waste management practices, to prevent waste leaking into the environment and potentially contributing to microplastics generation including the following;

    (a) **Reducing the amount of plastic waste that enters landfills and dumpsites** through the implementation of waste reduction policies and

initiatives, such as waste-to-energy programs and increased recycling.Microplastics can also be reduced by supporting the development and use of biodegradable plastic alternatives

10. **End-of-pipe interventions,** wastewater, stormwater, and road runoff management and treatment, to retain the emitted microplastics before these reach water bodies.
11. Maximizing clean drinking water supply to all citizens in the country
12. Other Best practices as listed below for minimizing microplastics in environment may be followed:
    - **(a)** Install physical barriers such as screens and filters on STP/WWTP systems to help reduce the amount of microplastics that enter rivers, lakes, and oceans.
    - **(b)** Support sustainable fishing practices to reduce the amount of microplastic entering rivers from fishing equipment.
    - (c) Implementation of Clean-up efforts for beaches and rivers

13. Training and capacity building including microplastic monitoring, analysis , health impact studies may be taken up for effective implementation of aforementioned points

Figure 6.1 : Best practices for litter management in marine

Annexure-1

Minutes of Meeting on "Committee Meeting in compliance of Hon'ble NGT order in the matter of O.A. No. 251 of 2022" with CIPET/ICMR /NCSCM held on April 19th , 2022

A Committee meeting was held virtually via video conferencing on April 19, 2022 in compliance of Hon'ble NGT order in the matter of O.A. No. 251 of 2022 for study of microplastics impact on environment and human health. The meeting was coordinated by UPC-II division, CPCB, Delhi. Various stakeholders including representative of CIPET, ICMR, and NCSCM participated in the meeting (List of participants is placed as **Annexure-I**).

DH UPC-II briefly explained directions of NGT for the study to be conducted which covers standards for safe environment, remedial steps to reduce menace of micro plastic and addressing other incidental issues.

She also explained the steps taken by CPCB with regards to microplastics which mainly include assessment of microplastic with NCSCM in Ground Water & Ambient Air in compliance of NGT's order O.A. no. 99 of 2021. She also informed about the study undertaken by National Productivity Council on assessment of microplastics in river Ganga. It was further informed that Ministry of Science and Technology has constituted a committee and working on methods for removal of micro-plastics from water. It was proposed that the as the objective of the two Committees are interlinked, this committee may include representation from NEERI and DST.

The report submitted in O.A. No. 99 of 2021 was shared by CPCB with committee members and it was emphasized that study to should focus on identification of source of micro-plastic in water bodies, standardisation of monitoring techniques, risk assessment or health impact of micro plastics, methods of remediation and mitigation measures.

Dr. Mohanty from CIPET informed about the various studies being conducted regarding micro plastics are given below:

- Estimation of micro plastics in Tapi and Damanganga under Indo-Norway joint project(INOPOL) in Gujarat region in which it was observed t that land based resources are main contributor for the micro plastics.

- Standards for micro plastics determination being developed by ISO are at draft stage.
- Study for estimation of Micro plastic due to Compostable plastic is under way.

She also said that the CIPET can undertake study related to analysis of microplastic in water, soil, oceans etc part can be taken care by CIPET. Effect of microplastics on water content can be correlated with the releavant ISO Standards.

Dr Raj Narayan Tiwari from ICMR, Bhopal informed that they have taken up the studies for identification of micro plastic in different matrices in Bhopal. He further informed that articles published in Journals which highlight genotoxicity and cytotoxicity due to Microplastica. However health related studies due to microplastics in India have not been carried out so far.

Mr. Mrinal K. Biswas, RD Kolkata, CPCB discussed that the study shall be conclusive and it should include source, quality, quantity, impact on environment & human health and finally development of the standards for micro plastics. He also pointed out that the current available studies as well as journals are required to be considered for framing of action plan for the study to be carried out. Apart from that, study is required to be done in short term and long term manner to propose standards for microplastics.

Mr Robin form NCSCM, informed that they are working in coastline riverine system of India for characterisation, quantification and ecotoxical aspects of microplastics. He said leakage study i.e. quantity of micro plastic from leachate, landfills and sewage entering into nearby water body and ground water are required to be conducted in this field.

Further Ms. Divya Sinha -DH, UPC-II concluded the discussions and informed that the study shall cover inventorization, method of analysis, risk assessment or health impact of micro plastics, standards for treated sewage, drinking & ground water and methods of remediation and mitigation measures. She also informed that the standard for micro plastics in air is being developed by Air Quality Division CPCB.It was also important to identify which type plastics contribute maximum to the

45

generation of micro plastics

All the group members were requested to share the information and studies carried out in field of micro plastics with the Committee as well as provide any further inputs on the subject . Mr Mrinal K Biswas RD Kolkata was requested to to prepare draft Action Plan covering the Action Points discussed during the meeting as identifying the roles to be assigned to different organization. The same shall be circulated to the Committee members for finalization

The meeting ended with vote of thanks to the chair.

46

Annexure-I

List of Participants

S.N.	Name and Designation
1.	Dr. Raj Narayan Tiwari, Director, ICMR-NIREH, Bhopal
2.	Dr.R.S.Dhaliwal, Scientist G & Head, NCD, ICMR Hqrs
3.	Dr. Smita Mohanty, Director & Head (Principal Scientist) CIPET Bhuwneshwar
4.	Dr Robin , NCSCM Chennai
5.	Ms. Divya sinha Additional Director & I/c UPC-II, CPCB
6.	Mr. Mrinal Kanti Biswas Scientist "E" & Regional Director, CPCB
7.	Ms. Yogesh Chandra Scientist- B, CPCB

Sl.No	Action Point Description			Responsible Organization	Timeline (tentative)
1	Compilation of existing information on Microplastics	a	Committee members shall share information available with them	CPCB CIPET ICMR NCSCM	30.4.22
		b	Compilation of information	CPCB- RD Kolkata	7.5.22
		c	Identification of Gap Areas	CPCB – RD Kolkata	7.5.22
2	Standardization of methodology for monitoring, characterization & analysis of microplastics. Parameters for characterization to include size, type of plastic etc. Instruments required for monitoring / analysis and testing protocols to be delineated			CIPET/ NCSCM	15.5.22
3	Assessment of microplastics covering source, transfer media & end use. Available information as per Section 1 above shall be compiled and emphasis shall be on areas not covered as well as at the end use points. Number of samples to be collected shall be limited by the available infrastructure for monitoring as well as time			Assessment to be carried out by CIPET/ NCSCM – depending upon the available infrastructure. CPCB/Concerned SPCB/PCC to provide requisite support for the monitoring. Assessment to be coordinated & Report to be prepared by CPCB – RD Kolkata	15.6.22
	Source Monitoring	a	Source emissions from industries /activities - Identification of specific industrial sectors contributing to microplastics through literature survey and monitoring microplastics at source		
		b	Leachate from		

			dumpsite/ landfill site		
		c	Sewage treatment plant inlet / outlet		
	Transfer media	c	Surface Water bodies		
		e	Soil		
		f	Marine water		
		g	Fish		
	End- use	f	Water Supply plants (Inlet & Outlet)		
		g	Ground water		
		h	Ambient Air		
4	Source identification of microplastics based on Assessment report			CPCB	
5	Risk Assessment : To be carried out based on the Assessment report specifically w.r.t microplastic concentration at end use point .Parallelly reports in media on adverse impact of microplastics may be reviewed and study taken up as per requirement. Recommendation of safe level of microplastics in drinking water based on literature survey/ experimental studies			ICMR / BIS	15.6.22
6	Development of treatment methods for remediation of microplastics from water / wastewater.			NEERI/ DST/ CPCB	15.6.22
7	Recommendation of measures for reduction of microplastics in environment based on Assessment report including the following: • Measures for Control of coastal zone/ deep sea pollution due to marine litter • Developing regulatory & market based instruments for preserving riverine and marine ecosystems			CPCB	15.7.22
8	Identification of areas were standards have to be notified (drinking water standards, effluent discharge standards & ambient air quality standards)			CPCB	31.7.22
9	Training of SPCBs/PCC/CPCB staff on monitoring and analysis of microplastics &			CIPET / NCSMS	31.7.22

	including identification of measures/ for strengthening of laboratory infrastructure (Parallel activity)		
10	Submission of report to MoEF&CC	CPCB	15.8.22

50

Minutes of Meeting on "Second Committee Meeting in compliance of Hon'ble NGT order in the matter of O.A. No. 251 of 2022" with CIPET/ICMR /NCSCM held on July 27th , 2022

Second Committee meeting was held virtually via video conferencing on July 27, 2022 for study of micro plastics impact on environment and human health. Various stakeholders including representative of CIPET, ICMR, and NCSCM participated in the meeting (List of participants is placed as **Annexure-I**).

RD Kolkata, CPCB made brief presentation on research gap in Indian scenario based on the research document shared by CIPET, ICMR, and NCSCM. Gaps in Standardization of Qualitative and Quantitative techniques, gaps in Matrices covered under the published literature from various Geographical regions, were highlighted during the presentation. Presentation made is enclosed as **Annexure-II.**

Further discussions regarding need for future research was held by the members and DH UPC-II requested to all the group members to make brief presentation in next meeting as per details given below:

- RD Kolkata, CPCB
  - Methodology for development of standards covering sample requirement
  - Source of micro plastic
  - Areas of monitoring
  - Requirement for sampling methods and analysis
  - Capacity building
  - Availability and Gaps
- CIPET and NCSM
  - Available resources of monitoring sampling and analysis
  - Possible coverage for monitoring with existing resources
  - Institutional mechanism to fulfill additional sampling/analysis requirements, if any.
- ICMR
  - Existing studies on impact of micro plastic on human health
  - Identification of areas for further intervention to assess impact of micro plastic on human health.

The meeting ended with vote of thanks to the chair.

Annexure-I

List of Participants

S.N.	Name and Designation
1.	Dr. Raj Narayan Tiwari, Director, ICMR-NIREH, Bhopal
2.	Dr. Surya Singh ICMR-NIREH, Bhopal
3.	Dr.R.S.Dhaliwal, Scientist G & Head, NCD, ICMR Hqrs
4.	Dr. Smita Mohanty, Director & Head (Principal Scientist) CIPET Bhuwneshwar
5.	Dr Robin , NCSCM Chennai
6.	Ms. Divya sinha Additional Director & I/c UPC-II, CPCB
7.	Mr. Mrinal Kanti Biswas Scientist "E" & Regional Director, CPCB
8.	Ms. Yogesh Chandra Scientist- B, CPCB

Minutes of Meeting on "Third Committee Meeting in compliance of Hon'ble NGT order in the matter of O.A. No. 251 of 2022" with CIPET/ICMR /NCSCM held on August 5th, 2022.

Third Committee meeting was held virtually via video conferencing on August 5th, 2022 in compliance of Hon'ble NGT order in the matter of O.A. No. 251 of 2022 for study of micro plastics impact on environment and human health. Various stakeholders including representative of RD Kolkata, CIPET, ICMR, and NCSCM participated in the meeting (List of participants is attached as ***Annexure-I***).

Mr Mrinal K Biswas, RD Kolkata, CPCB, described the action plan for development of standards for microplastics. He provided examples from other countries which already have their own practices for managing microplastics. RD Kolkata ended their presentation with the proposed execution plan and the roles to be assigned to different organizations, for developing environmental standards. (The presentation is here attached as ***Annexure-II***)

The meeting progressed with the second presentation by NCSCM, where the information about protocol for analysis of microplastic in sediment, water & biota was briefly explained by them. They also explained the importance of surrounding environment from which sample has been taken, for analysis of microplastic.

Last presentation of the meeting was given by ICMR-NIREH Bhopal, where the results from the studies which have already been done on the presence of microplastic and their possible effects on human body, were discussed. Instruments which may be used for estimating the concentration of microplastics were also discussed during the presentation. (The presentation is here attached as ***Annexure-III***)

Ms. Divya Sinha -DH, UPC-II concluded the discussions with request to provide detailed information as annexed below, latest by **22/08/2022**, regarding the efficient methodologies adopted by CIPET & NCSCM for analysis of samples for microplastics in the environment.

The meeting ended with vote of thanks to the chair.

CIPET and **NCSCM** are required to provide the following information, latest by 22/08/2022, on testing and analysis of microplastics for drinking water, groundwater, compost/leachate samples:

Heads	Drinking water Sample	Groundwater Sample	Compost/leachate Sample
Methodology for testing and analysis			
Instruments Required			
Time period required for analysis			
Cost incurred per sample			
Presence/Coverage area of Organization			
Studies available			

Annexure I

List of Participants	
S. No.	**Name and Designation**
1.	Mr. Mrinal Kanti Biswas Scientist "E"; Regional Director, CPCB
2.	Dr. Raj Narayan Tiwari, Director, ICMR-NIREH, Bhopal
3.	Dr. Surya Singh, ICMR-NIREH, Bhopal
4.	Dr. Smita Mohanty, Director & Head (Principal Scientist), CIPET Bhuwaneshwar
5.	Mr. Himalaya Vardikar, CIPET LARPM, Bhuwaneshwar
6.	Ms. Divya sinha, Additional Director & I/c UPC-II, CPCB
7.	Ms. Yogesh Chandra, Scientist- B, CPCB
8.	Mr. Madnesh Kumar Dubey, Scientist- B, CPCB
9.	Mr. Mayank Raj Purbey, Scientist- B, CPCB

ANNEXURE-II

3rd Meeting of the 55 expert committee on "Development of standards for Microplastics"

CPCB

-By-

Central Pollution Control Board

Regional Directorate, Kolkata

56

NGT order

- As per the Hon'ble NGT order dated 05.04.2022 pertaining to OA no. 251/2022 of 2022, where it has been directed that:

  *"There is need for **further studies**, considering the studies already conducted, to be steered by the Committee comprising of CPCB, ICMR, Central Institute of Petrochemicals Engineering & Technology (CIPET), NCSCM, and any other expert institutions as required, under the Nodal coordination of CPCB. Such studies and recommendations/ suggestions **may cover standards for safe environment, remedial steps** to **reduce menace of micro plastic** and **addressing other incidental issues**. CPCB may incur expenditure on studies and other incidents out of Environmental Compensation funds."*

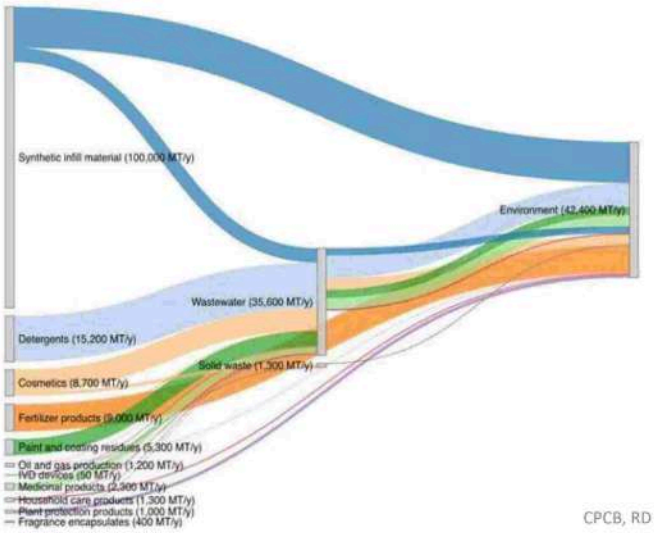
  &

- *" Having regard to the media report that violation of environmental norms in handling of plastics is resulting in serious adverse health effect on human beings, it appears to be necessary to **ensure strict compliance of environmental norms** and to undertake **further study** to consider **whether the existing policies of enforcement of environmental norms need to be revisited in any manner in the interest of human health."***

57 International initiatives - EU

Regulations to control the pollution:

- Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)
- Committee for Socio-Economic Analysis (SEAC)



- Sankey plot showing major sources and sinks of primary microplastic emissions in the EU. Emissions to the environment include those to both the aquatic and terrestrial compartment. (Rheinberger et al., 2021)

.....International initiatives till date – Europe

- In 2018, Commission adopted European Strategy for Plastics – a Circular Economy, about €100 million (for 2 yrs) has been allocated for implementation of plastics strategy and R&D projects.
- In January 2019, ECHA(European Chemical Agency) proposed a wide-ranging restriction on microplastics expecting to **prevent** the release of **5,00,000 tonnes of microplastics over 20 years.**
- **Development in 2022.....**

Specific laws with partial objectives	Directives for unintentional formation of microplastics	Production & release into the environment, both directly and indirectly
1. Marine Strategy Framework 2. Fertilising Products Regulation 3. REACH restriction proposal	1. Plastics Waste Framework strategy 2. Waste Framework Directive 3. Marine Strategy Framework Directive	1. Eco-design Directive 2. Waste Framework 3. Urban Waste Water Treatment Sewage Sludge 4. Directive on air quality 5. Industrial Emissions 6. Regulation on tyre labelling 7. Regulation on motor vehicle type approval

.....International initiatives till date – USA

59

- December 18, 2015, Congress amended the Federal Food, Drug and Cosmetic Act (FD&C Act) by passing the **Microbead-Free Waters Act of 2015**.
  - ❖Prohibits manufacturing, packaging, and distribution of rinse-off cosmetics containing plastic microbeads.
  - ❖This new law also applies to products that are both cosmetics and non-prescription (also called “over-the-counter" or "OTC") drugs, such as toothpastes.

60

Indian scenario

BIS 2017 : Plastic microbeads of diameter 5 mm or less, that are insoluble in water, and solid plastic particles used to exfoliate or cleanse in personal care products are banned

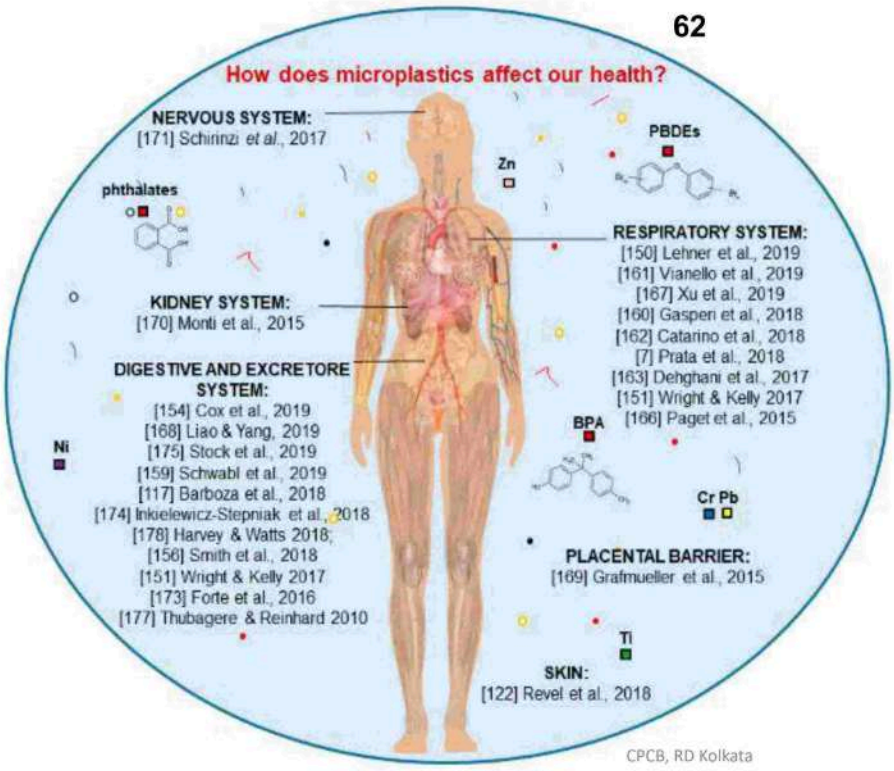
Plastic Waste Management (Second Amendment) Rules, 2022:

a. Banned all single-use plastics from 1st July 2022.
b. mandate to increase the thickness of plastic carry bags to over 120 microns from December 31.
c. Banned imports of solid plastic waste from March 2019

61

Why do we need a standard?

62



Overview of scientific studies focused on the effects of micro and nanoplastics on human health.

Colored squares represent pollutants (organic and inorganic) that could be present in environmental matrices (free or associated with micro and nanoplastics) and that could enter into the human body through different entry routes.

Campanale et al., 2021

Pollutants being carried by MP

Organism exposed to MP

How to develop a standard?

64

1. Scientific stages

(a) Knowledge of the hazard: involves identification and characterization of microplastic.

(b) Evaluation of the risk: establishes the probability and severity of potential adverse effects of microplastic on health and safety.

(c) Assessment of hazard: determination routes of microplastic exposure and estimation of the number of people exposed.

2. Political and administrative stage

65

(a) Acceptance to the tolerable risk

(b) Determination to safeguard the public

(c) Consideration of human ecology

(d) Choice of control technology requires both formulations of strategy and selection

(e) Legislation standards consider the existing national legal framework and identify necessary legal strategies.

(f) Economics

Segments for Developing Environmental standard

Segment	Execution plan
1. Identification of priority pollution issue	❑ **Standard methodology for Sampling, processing and analysis** ❑ **Finalization of the matrix: Assessment of Quality & Quantity** A. Water (River, Lakes, Dams, Marine, Leachates & Ground Water B. Solid (Sediments, Sludge, Soil) C. Air (Rural, Urban & fugitive industrial emission) D. Biota (Fishes, Micro invertebrates) E. Packaged foods/drinks F. Existing water and waste water treatment facilities
2. Information on health effects	**ICMR-NIREH**
3. Assessment of exposure	Through Outcome of 1 & 2: A. Major Sources & budgeting B. Quality & Quantity C. Impact (includes risk) on Environment & Human D. Removal efficiencies of existing facilities
4. Strategies for prevention and control	A. Identification & Banning of selective additives usage and processes B. Technological intervention for removal MP and reuse of Plastic C. Issuance of directives restricting production and release D. Source control by legislation and awareness programs E. Promoting alternatives

……Segments for Developing Environmental standard

67

Segment	Execution plan
5. Legal framework	1. Nature of the decision 2. Scope and development of environmental legislation 3. Content and structure of regulation 4. Institutional consideration 5. Geographical dimension of environmental problems 6. Supporting measures for regulatory strategy
6. Consequences of different approaches to environmental health protection	1. Optimisation of Preventive methods and socio-economic impacts
7. Decision-making process	1. Interaction between science and policy 2. Constraints affecting development of the country 3. Finalization of the standards for **a) Discharge into** i. Inland surface water, ii. Public Sewers, iii. Land for irrigation and iv. Marine coastal areas b) **Acceptable limits** for drinking water supply

Work Distribution for identification & exposure study

❑ Distribution to cover the Matrices, Locations to address the gap

Sl no	Segment	Institutional Distribution
1	Spatial Analysis of Water, Soil & biota STPs/WTP, Solid waste Dump sites	Eastern Zone: CPCB – RD Kolkata Western Zone: CPCB – RD Vadodara Central Zone: ICMR – NIREH, Bhopal Northern Zone: CPCB Delhi Southern Zone: NCSCM, Chennai
2.	Air pollution	CPCB Delhi
3.	Coastal & Marine pollution	NCSCM, Chennai
4.	Health effect study	ICMR – NIREH, Bhopal
5.	Cosmetics, Packaged food & drinks	CIPET

CIPET having adequate infrastructure and network, may initiate sampling and analysis in all the 4 zones (except south), till capacity building is done in other participatory institutes

Matrix and Location wise work plan: River

Sl. no.	Matrix	Segment	Existing study (Approx.) by independent researcher		Proposed representative study area (Water, Sediment & Biota)			
					Control group		Polluted stretch	
			Number	Name	Number	Name	Number	Name
1.	Water, Sediment & Biota, Water intake points	River	9	1. Ganga* 2. Brahmaputra* 3. Meghna 4. Adyar 5. Kosasthalaiyar 6. Multhirappuzhayar 7. Netravati 8. Alakananda 9. Indus * Few locations covered only	1	Umngot /Dawki	17	1.Ganga 2. Damodar 3. Bidyadhari 4. Yamuna 5. Cauvery 6. Mahanadi 7. Godavari 8.Krishna 9. Narmada 10. Tapi 11. Mandovi & Zuari 12. Netravati & Sharavathi 13. Kochi Backwaters 14. Neendakara 15. Perumadhura

70

Lake

Sl no	Matrix	Segment	Existing study (Approx) by independent researcher		Proposed representative study area (Water, Sediment & Biota)			
					Control group		Polluted stretch	
			Number	Name	Number	Name	Number	Name
2.	Water, Sediment, Biota Water intake points	Lakes	5	1. Veeranam lake, TN 2. Red hills Lake, TN 3.Vembanad lake, Kerala 4. Renuka lake, HP 5. Anchar lake, Northwest Himalaya	2	Kankaria lake, Gujrat Gurudongmer, Sikkim	15	1. Mirik lake, WB 2. Santragachi, WB 3. Ambazari Lake, Maharashtra 4. Puskar Lake, Rajasthan 5. Naraina Lake, Gujarat 6. Dal lake, J&K 7. Bellandur Lake, Bangalore 8. Naini lake, UK 9. Hussain Sagar, Telangana 10. Chilika Lake, Odisha 11. Vembanad lake, Kerala 12. Pulicat Lake, AP 13. Kolleru Lake, AP 14. Upper lake, MP 15. Lower lake, MP

71

Dam

Sl no	Matrix	Segment	Proposed representative study area (Water, Sediment & Biota)	
			Polluted stretch	
			Number	Name
3.	Water, Sediment & Biota, Water intake points	Dams	10	1. Panchet, WB 2. Mythan, Jharkhand 3. Hirakund, Odisha 4. Nizam Sagar Dam, Telangana 5. Sardar sarovar, Gujarat 6. Tehri, UK 7. Tungavadra, Karnataka 8. Uri Hydroelectric Dam, J& K 9. Gandhi Sagar Dam, MP 10. Kolar Dam, MP 11. Idukki Dam, Kerala 12. Govind Ballabh Pant Sagar Dam , UP 13. Jayakwadi Dam, Maharashtra

72 Ground water & Marine water

Sl no	Matrix	Segment	Existing study (Approx) by independent researcher		Proposed representative study area (Water, Sediment & Biota)
			Number	Name	Polluted stretch
4.	Water, Sediment & Biota	Ground Water (water extraction point)	2	Chennai, TN Punakayal, TN	State wise, representative data collection considering both urban and rural areas.
	Water, Sediment & Biota	Marine water & Coastal Pollution	41	Karnataka Kerala Tamilnadu Andaman Nicober Lakshyadweep	Sampling point: 1. Transect at every 200km interval along the coastal line of West Bengal, Odisha, AP, Goa, Maharashtra, Gujarat 2. Upto 200m depth contour (continental shelf)

73

Others

Sl no	Matrix	Segment	Existing study (Approx) by independent researcher		Proposed study area	
					Polluted location	
			Number	Name	Number	Name
5.	Soil, Leachate & affected GW	Solid waste Dumpsite	0	none		State wise 1 or 2 major dumpsite
6.	Air	Urban	4	Chennai, TN Patna , Bihar Nagpur, Maharashtra Varanasi, UP	**As per the ongoing study by CPCB**	
7.	Health effect	Animal study Clinical study Human study	11	Arthropod and fishes	**Plan to be developed by ICMR NIREH**	

Evaluation of existing treatment technologies

74

Sl. No.	Treatment	Matrix	Technology wise evaluation (State wise evaluation)	
			Conventional	Advanced
1	Sewage treatment plants	Water & sludge	AL OP ASP TF	SBR MBBR FBAS MBR & others
2	Water treatment plants		State-wise evaluation	State-wise evaluation

75 Immediate action

Preparation and submission of interim report to Hon'ble NGT:

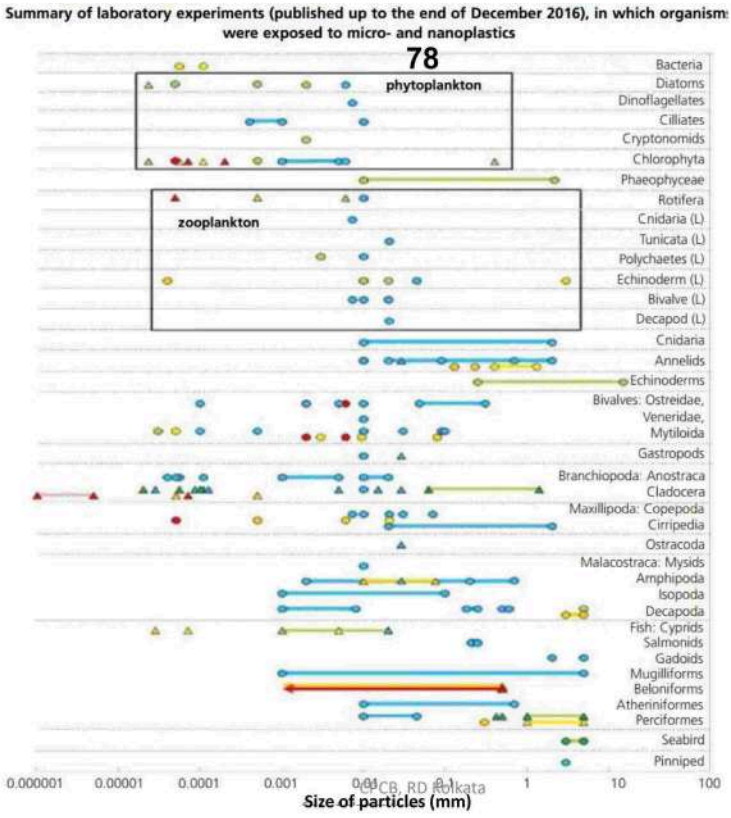
1. Distribution of microplastics in the environment – based on LIMITED studies in Indian context.
2. Impact on Environment – based on international studies
3. Impact on Human Health – based on international studies
4. Gap analysis & proposed methodology for the study indicating requirement for establishing a strong database, budgeting, impact, prevention and control.


76
Thank You
CPCB, ZD Kolkata
22
222
63

Table 2 Types of pollutants carried by different types of microplastics

Microplastic	Pollutant	Reference
PA	Benzene derivative	Rehse et al. (2018)
PBAT	Heavy metals	Kedzierski et al. (2018)
PE	Lubrication oil	Haghi and Banaee (2017)
	PAH	Oliveira et al. (2013)
	Paraquat	Rochman et al. (2013b)
	PBDE	Llorca et al. (2018)
	PCB	Wang et al. (2015)
	Per- and polyfluoroalkyl substances	Fisner et al. (2017)
	PFOSA	Zhan et al. (2016)
	PPCP	Hu et al. (2017)
	Triclosan	Frydkjær et al. (2017)
PET	Heavy metals	Rochman et al. (2013a)
PP	Heavy metals	Rochman et al. (2013b)
	PAH	Fisner et al. (2017)
PS	Antibiotic	Wen et al. (2018)
	Cadmium	Zhang et al. (2019b)
	Lubrication oil	Llorca et al. (2018)
	PCB	Wang et al. (2015)
	Per- and polyfluoroalkyl substances	Guo et al. (2018)
	PFOSA	Zhan et al. (2016)
	Roxithromycin	Hu et al. (2017)
PVC	17α-Ethinylestradiol	Qu et al. (2018)
	Antibiotic	Sleight et al. (2017)
	Benzene derivatives	Kedzierski et al. (2018)
	Heavy metals	Rochman et al. (2013a)
	Odesmethylvelafaxine	Pascall et al. (2005)
	PCB	Wu et al. (2016)
	PFOSA	Guo et al. (2018)
	Phenanthrene	
	Venlafaxine	
LDPE	Heavy metals	Rochman et al. (2013a)
HDPE	Heavy metals	Holmes et al. (2014)

PBAT polybutylene adipate terephthalate, *HDPE* high-density polyethylene, *PFOSA* perfluorooctanesulfonamide, *PPCP* pharmaceuticals personal care product



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ANNEXURE-III

3RD MEETING OF THE EXPERT COMMITTEE ON MICROPLASTICS

(*w.r.t.* Hon'ble NGT OA No. 251/2022 of 2022)

Convened by

Central Pollution Control Board, Delhi

Presented by

ICMR – National Institute for Research in Environmental Health (NIREH), Bhopal

Human Health Research Scenario

Microplastics have been reported and estimated in:

- Human saliva
- Human blood
- Human placenta
- Human colon
- Human stool
- Human lungs

Human Saliva 81

Total number of studies till date: 1

No. of human samples: 2000

Instrument: μRaman Spectroscopy

Total number of particles reported: 650

Concentration of MP reported: 0.33 particles / individual

Impact on health: Not reported

Ref. Abbasi et al. 2021, Human exposure to microplastics: A study in Iran

Human Blood 82

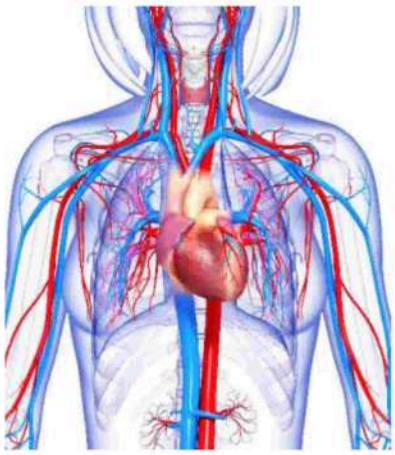
Total number of studies till date: 1

No. of human samples: 22

Instrument: Pyr GC – MS (limitation 700 nm)

Concentration of MP reported: 1.6 µg / mL

Impact on health: Not reported



Ref. Leslie et al. 2022, Discovery and quantification of plastic particle pollution in human blood

Human Placenta 83

Total number of studies till date: 1

No. of human samples: 6

Instrument: μRaman Spectroscopy (limitation 5 μm)

No. of MP particles reported: 12 particles in 4 samples out of 6 tested

Impact on health: Not reported

Ref. Rasuga et al. 2021, Plasticenta: First evidence of microplastics in human placenta

Human Colon 84

No. of human samples: 11

Instrument: FTIR Microscope

Concentration of MP reported: 28 ± 15.4 particles / g colon tissue

No. of MP particles reported: 331 particles / individual specimen

Impact on health: Not reported

Ref. Ibrahim et al. 2020, Detection of microplastics in human colectomy specimens

Human Stool

First Study

No. of human samples: 8

Instrument: FTIR microspectroscopy (limitation 50 µm)

Concentration of MP reported: 2 particles / g of stool

Impact on health: Not reported

Second Study

No. of human samples: 24

Instrument: FTIR microspectroscopy

No. of MP particles reported: 1 particle / g - 36 particles / g of stool

Impact on health: Not reported

Ref. Schwabl et al. 2019, Detection of various microplastics in human stool
Zhang et al. 2021, You are what you eat: Microplastics in feces of young men living in Beijing

Human Lungs 86

First Study

No. of human samples: 13

Instrument: μFTIR Spectroscopy (limitation 3 μm)

Concentration of MP reported: 0.69 ± 0.84 particles / g lung tissue

No. of MP particles reported: 39 particles in 11 samples out of 13 tested

Impact on health: Not reported

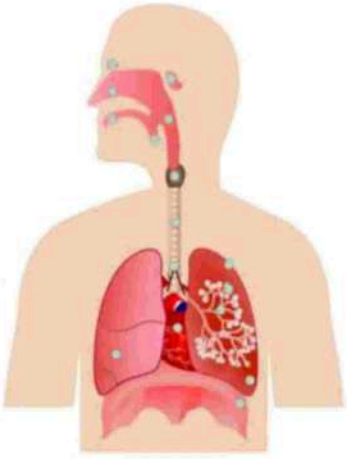
Second Study

No. of human samples: 20

Instrument: Raman Spectroscopy (limitation 20 μm)

No. of MP particles reported: 37 particles in 13 samples out of 20 tested

Impact on health: Not reported



Ref. Jenner et al. 2022, Detection of microplastics in human lung tissue using μFTIR spectroscopy
Amato-Lourenco et al. 2021, Presence of airborne microplastics in human lung tissue

Human Health Research Scenario in the Area of Microplastics

Genotoxic and cytotoxic effects of microplastics in human blood lymphocytes

No. of human samples: 2

Size of microplastic particle studied: 10 – 45 µm

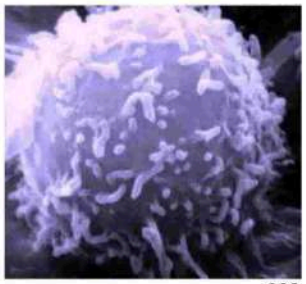
Type of microplastic particle studied: Polyethylene

Concentrations of MP studied: 25, 50, 100, 250, 500 µg/mL of blood

Type of study: *in-vitro*

Result: Genomic instabilities were reported

Mechanism: Unknown



233

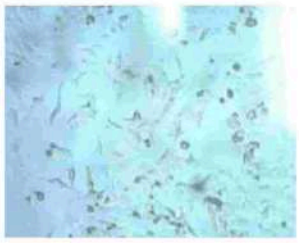
74

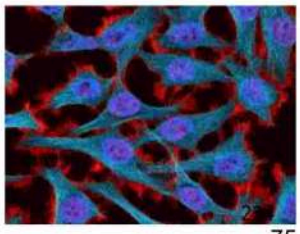
Ref. Cobanoglu et al. 2021, Genotoxic and cytotoxic effects of polyethylene microplastics on human peripheral blood lymphocytes

Human Health Research Scenario in the Area of Microplastics

Cytotoxic effects of microplastics *accompanied by* metal nanoparticles in human cerebral and epithelial cells

- Size of microplastic particle studied: 3 – 16 µm
- Type of microplastic particle studied: Polyethylene & polystyrene
- Concentrations of MP studied: 50 µg/L to 10 mg/L
- Type of study: *in-vitro*
- Result: Oxidative stress was reported





Ref. Schirinzi et al. 2017, Cytotoxic effects of commonly used nanomaterials and microplastics in cerebral and epithelial human cells

Key Takeaways..89

- *Studies are only about the presence of microplastics in human body, NOT about their physiological / psychological impact*
- *Studies showing the genotoxic and cytotoxic impacts of the microplastics are in-vitro studies, conducted over ONLY two individuals*
- *Health impacts of emerging contaminants (e.g. MPs) are chronic. So, long-term studies are required to establish CAUSE-EFFECT RELATIONSHIP*
- *Without establishing cause-effect relationship, it would not be appropriate to set STANDARDS for drinking water having microplastics*

Item No. 06 (Court No. 1)

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

(By Video Conferencing)

Original Application No. 251/2022

In re: News item published in The Hindu dated 29.03.2022 titled **"Detecting microplastics in human blood"**

Date of hearing: 05.04.2022

CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON
HON'BLE MR. JUSTICE SUDHIR AGARWAL, JUDICIAL MEMBER
HON'BLE MS. JUSTICE PUSHPA SATHYANARAYANA, JUDICIAL MEMBER
HON'BLE PROF. A. SENTHIL VEL, EXPERT MEMBER

ORDER

1. Proceedings have been initiated in light of captioned media report to the effect that in absence of enforcement of environmental norms on the subject, small particles of plastics enter the blood cells of human being through food, having adverse health impact.

2. Having regard to the media report that violation of environmental norms in handling of plastics is resulting in serious adverse health effect on human beings, it appears to be necessary to ensure strict compliance of environmental norms and to undertake further study to consider whether the existing policies of enforcement of environmental norms need to be revisited in any manner in the interest of human health.

3. It appears from the record that the Southern Bench of NGT has taken up Suo Moto based on similar media reports in OA No. 99/2021(SZ), *Tribunal on its own motion Suo Motu based on the news*

item in The Times of India Newspaper, Chennai Edition dt. 05.04.2021, "Chennai, you are breathing micro plastic" vs. The Chief Secretary to Government of Tamil Nadu Chennai and Ors. and OA No. 174/2021(SZ), *Tribunal on its own motion Suo Motu based on the news item in The Times of India Newspaper, Chennai Edition dt. 27.07.2021, "High level of metals PM 2.5 found in city's air you're breathing" vs. The Chief Secretary to Government of Tamil Nadu Chennai and Ors.*, wherein CPCB carried out study on analysing micro plastic in ground water in context of landfills leachate and analysis through National Centre for Sustainable Coastal Management (NCSCM), Chennai. To avoid conflicting orders, the said matters stand transferred to the Principal Bench of this Tribunal for being dealt alongwith the present matter. Counsel appearing in the said matters be informed by e-mail. If they have any objection, they are at liberty to move this Tribunal. Record of the said matters be called for in the form of scanned documents. It is not necessary for the time being to call for the original record which may be retained at Chennai Bench. The date fixed in the said matters will stand deferred to 19.10.2022 on which the present matter will now be listed. The titles of the said matters be now modified as *In re: News Item published in The Times of India, Chennai dated 05.04.2021 titled* ***"Chennai, you are breathing micro plastic"*** in OA No. 99/2021(SZ) and *In re: News Item published in The Times of India, Chennai dated 27.07.2021 titled* ***"High level of metals PM 2.5 found in city's air you're breathing"*** *in* OA No. 174/2021(SZ).

4. There is need for further studies, considering the studies already conducted, to be steered by the Committee comprising of CPCB, ICMR, Central Institute of Petrochemicals Engineering & Technology (CIPET), NCSCM, and any other expert institutions as required, under the Nodal coordination of CPCB. Such studies and recommendations/ suggestions

may cover standards for safe environment, remedial steps to reduce menace of micro plastic and addressing other incidental issues. CPCB may incur expenditure on studies and other incidents out of Environmental Compensation funds.

5. The report of the study with suggestions for remedial action may be filed before this Tribunal by e-mail by August 31, 2022 with a copy to the Secretary, MoEF&CC as input for consideration of policy on the subject. MoEF&CC may file its action taken report in the matter before the next date by e-mail at judicial-ngt@gov.in preferably in the form of searchable PDF/ OCR Support PDF and not in the form of Image PDF.

List for further consideration on 19.10.2022.

A copy of this order along with the media report be forwarded to CPCB, ICMR, CIPET, NCSCM, Chennai and MoEF&CC by e-mail for compliance.

Adarsh Kumar Goel, CP

Sudhir Agarwal, JM

Pushpa Sathyanarayana, JM

Prof. A. Senthil Vel, EM

April 05, 2022
Original Application No. 251/2022
SN

Annexure-V

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार.
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVT. OF INDIA.

F.No. CP-20/139/2021-UPC-II-HO-CPCB-HO-Part(2) November 12, 2024

To,

The Member Secretary
SPCBs/PCCs
(AS PER LIST)

Directions under Section 5 of the EPA, 1986 regarding compliance of various provisions under Schedule-II of Plastic Waste Management Rules, 2016, i.e., Guidelines on Extended Producer Responsibility (EPR)

WHEREAS, the Ministry of Environment, Forest & Climate Change (MoEF&CC) has notified Plastic Waste Management Rules, 2016, in exercise of the powers conferred under sections 3, 6 & 25 of the Environment (Protection) Act, 1986 vide Notification No. G.S.R 320 (E) dated March 18, 2016; and

WHEREAS, Guidelines for Extended Producers Responsibility for Plastic packaging were notified by MoEF&CC on February 16, 2022 as Schedule-II of the Plastic Waste Management Rules, 2016; and

WHEREAS, as per Section 6.1(a) of the EPR Guidelines, "The following entities shall register on the centralized portal developed by Central Pollution Control Board namely:- (1) Producer (P); (ii) Importer (1); (iii) Brand owner (BO), (iv) Plastic Waste Processor engaged in (a) recycling, (b) co-processing (c) waste to energy, (d) waste to oil, and (e) industrial composting; and

WHEREAS, as per section 10.1 of the above Guidelines, the Producers, Importers & Brand Owners shall have to register through the online centralized portal developed by Central Pollution Control Board. The certificate of registration shall be issued using the portal; and

WHEREAS, as per Section 12.4 of EPR Guidelines, Central Pollution Control Board by itself or through a designated agency shall verify compliance of Producers, Importers & Brand-Owners through inspection and periodic audit, as deemed appropriate. Central Pollution Control Board, as required, can also verify compliance of Plastic Waste Processors through inspection and periodic audit. In case of plastic waste processors and Producers, Importers & Brand-Owners operating in a State or Union Territory, Central Pollution Control Board may, if required, direct State Pollution Control Board or Pollution Control Committee to take action; and

WHEREAS, as per Section 13.1 of EPR Guidelines, the concerned State Pollution Control Board or Pollution Control Committee shall register Producers, Importers & Brand-Owners (operating in one or two states) and plastic waste processors, through the online portal developed by Central Pollution Control Board. Provision for registration shall be made on the Extended Producer Responsibility portal. State

O/C

Pollution Control Board or Pollution Control Committee by itself or through a designated agency shall verify compliance of Producers, Importers & Brand-Owners through inspection and periodic audit, as deemed appropriate, of Producers, Importers & Brand-Owners as well as plastic waste processors in their jurisdiction as per the Plastic Waste Management Rule, 2016; and

WHEREAS following Directions dated 20.11.2023 were issued to the SPCBs/PCCs:

1. *To take immediate necessary actions to improve upon the system of grant of registration within SPCB/PCC, monitoring and enforcement ensuring enforcement of the PWM Rules, EPR guidelines and directions/guidelines issued by CPCB, including the following:*

a. *To re-check processing facilities of Registered PWPs in your state and to confirm that the Processing capacity as per the Registration granted to them is in conformity with the actual facilities available in the unit. All other details provided in the online application form are also to be revalidated by SPCB/PCC.*
b. *To regularly monitor EPR Certificate generation process of the Registered PWPs ensuring that EPR Certificates generated by PWPs are in accordance with requirements prescribed in CPCB guidance manual such as uploading of GST E-invoice corresponding to the sales of finished on the EPR Portal.*
c. *If violations are observed as per (a) & (b) above, to conduct detailed enquiry into the issue of CTE and CTO and also as to how physical verification of the Unit was approved by SPCB/PCC, in view of the gross violations observed also as to why the process of generation of EPR Certificates was not monitored by SPCB/PCC.*
d. *To fix the liability on erring official/s and take disciplinary action against erring officials, if any, as per the findings of the enquiry set up, as at (c) above.*

2. *To take the following actions against the defaulting PWPs, if any, identified as per (1) above:*

i. *To suspend the consent/authorization/registration issued to the defaulting PWPs, with immediate effect and issue show cause notice to debar such PWPs from operating under the Extended Producer Responsibility framework for a period of one year as per Clause 11.4 of the EPR Guidelines or/ and for revocation of the consent/authorization/registration issued to the Unit;*
ii. *To levy Environmental Compensation (EC), corresponding to the quantum of EPR certificates generated not in conformity with requirement prescribed in CPCB Guidance manual for operating Centralized EPR Portal. The EC is to be levied as per "Guidelines for Assessment of Environmental Compensation to be levied for violation of PWP Rules" (https://cpcb.nic.in/uploads/plasticwaste/EC_Regime_PWM.pdf) and Unit be directed to deposit the same in the designated Escrow Account, created by the SPCB/PCC for the purpose.*
iii. *To take necessary action as per applicable law against violating PWPs which have submitted false documents for obtaining registration as well as for generating EPR certificates. It may further be ensured that action taken by SPCB/PCC regarding these units should act as a deterrent for other Units in committing such violations.*

3. *To take all necessary steps to ensure that PWPs henceforth complies with all conditions including generating GST E-invoice for all sales of only finished products and uploads the same on the EPR Portal, failing which necessary action be immediately taken including levying of EC against each non-complying Unit.*

You are hereby directed to take necessary action immediately for ensuring compliance of aforesaid directions and submit the action taken report to this office within 10 days from the date of issuance of this direction."

WHEREAS, Action Taken Report (ATR) from your SPCB/PCC, for the directions issued dated 20.11.2023, has not been received till date CPCB; and

WHEREAS, CPCB has developed the Audit app and web module for the purpose of conducting audit of registered PWPs with the provision for online submission of reports by auditors; and

WHEREAS, CPCB has also developed the 'Standard Operating Procedure (SOP) for conducting audit of registered PWPs' for assistance and guidance to auditors; and

WHEREAS, several news articles have been published in the national as well as the local newspapers on authenticity of the EPR certificates being generated by the registered PWPs; and

WHEREAS, the matter has also been taken up by Hon'ble NGT vide its Original Application No. 926/2024 News Item titled "6 lakh fake pollution-trading certificates unearthed in three States" appearing in The Hindu dated 14.07.2024; and

WHEREAS, in EPR Certificates of the order of Ninety Lac Tones have been generated till date, of which EPR Certificates of **as per list** Tones have been generated by **as per list** registered PWPs in your state/UT; and

WHEREAS, in view of aforementioned points, it has been decided to conduct audit of all PWPs which have generated EPR Certificates. It has further been decided to Audit 474 PWPs which have generated > 200 T of EPR Certificates in the first Phase I, out of which 134 PWPs are to be audited by concerned SPCBs/PCCs; and

WHEREAS, CPCB, vide letter dated 02.08.2024, had assigned **as per list** no. of PWPs to your SPCB/PCC for Audit; and

WHEREAS, several communications have been issued and meetings have been convened by CPCB including meeting chaired by Chairman, CPCB on the subject; and

WHEREAS, meeting was convened by Member Secretary, CPCB, on October 10, 2024 in which issues related to generation of EPR Certificates and Audit of PWPs were highlighted and the concerned SPCBs/PCCs were requested to complete the Audit of assigned PWPs on priority;

WHEREAS, meeting was convened on October 29, 2024 wherein the CPCB demonstrated the updated features of the Audit web module; and

WHEREAS, Audit of assigned PWP units has not been initiated /completed so far by your; and

WHEREAS, CPCB has conducted Audit of 133 PWPs and grave lapses including registered processing being much higher than actual processing capacity, improper documents being uploaded in the sales section etc. have been observed despite the fact that Directions dated 20.11.23 have already been issued to your office; and

WHEREAS, in view of the aforementioned points, Audit of the PWP is essential to correlate the quantum of EPR Certificates generated with the quantity of plastic waste actual processed by the Unit;

NOW THEREFORE, in compliance of above and in exercise of powers vested under Section 5 of Environment (Protection) Act, 1986 to the Chairman, CPCB, following directions are hereby issued to all SPCBs/PCCs for compliance:

a. To immediately complete audit of the PWPs as assigned vide above mentioned letter dated 02.08.2024 in line with the SOP for conducting audit of registered PWPs.
b. To submit the report duly approved by Member Secretary of the SPCB on the audit web module within 10 days of issuance of this direction.
c. To submit Action taken report w.r.t. above mentioned directions dated 20.11.2023 issued by CPCB.

You are hereby directed to take necessary action for compliance of aforesaid directions and submit the action taken report to this office within 15 days of receipt of this direction.

(Tanmay Kumar)
Chairman, CPCB

Copy To:

1. DH-IT

Bharat Kumar Sharma
(Member Secretary)

List of SPCB/PCC

Sl. No.	State Name	Number of registered PWPs generated EPR Certificate	Generated EPR Certificates (Tones)	Number of PWPs to assigned for audit
1.	GUJARAT	150	654844	74
2.	JAMMU AND KASHMIR	13	3185	4
3.	KARNATAKA	58	381747	3
4.	KERALA	12	104869	2
5.	MADHYA PRADESH	50	761879	16
6.	MAHARASHTRA	110	657829	13
7.	RAJASTHAN	39	548794	12
8.	UTTAR PRADESH	62	665069	1
9.	UTTARAKHAND	42	124680	5
10.	WEST BENGAL	15	45807	2

5

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार.
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVT. OF INDIA.

F.No.CP-20/137/2021-UPC-II-HO-CPCB-HO Date: 11 . 11 .2024

To,

The Member Secretary
All SPCBs/PCCs

Sub: - Directions under Sec 5 of Environment (Protection) Act, 1986 for enforcement of Rule 4(h) and 4(ha) of Plastic Waste Management (PWM) Rules

WHEREAS, the Ministry of Environment, Forest & Climate Change (MoEF&CC) notified the PWM Rules, 2016, in exercise of the powers conferred under section 3,6, & 25 of the Environmental (Protection) Act, 1986 Vide Notification No. G.S.R. 320 (E) dated March 27, 2016; and

WHEREAS, under rule 4(h) of PWM Rules 2016 (as amended), "*the provision of thickness under clause (c) shall not apply to carry bags or commodities made from compostable plastic or biodegradable plastics. Carry bags and commodities made from compostable plastics shall conform to the Indian Standard: IS/ISO 17088:2021 titled as Specifications for Compostable Plastics*"; and

WHEREAS, under Rule 4(ha) of PWM Rules 2016 (as amended) *"the manufacture of carry bags and commodities covered under sub rule (3) shall be permitted to be made from compostable plastics or biodegradable plastics subject to mandatory marking and labelling laid down under these rules and the regulations of the Food Safety and Standards Authority of India for food contact applications. The manufacturers of compostable plastic or biodegradable plastic carry bags or commodities permitted under the rules, shall obtain a certificate from the Central Pollution Control Board before marketing or selling*"; and

WHEREAS, Central Pollution Control Board has updated Standard Operating Procedure (SOP) for issuing Certificate to Manufacturers of Compostable Plastic Carry Bags and commodities in August 2022; and the same is uploaded on CPCB website at https://cpcb.nic.in/uploads/plasticwaste/SOP-IssueCert-CompostableplasticManufacturers.pdf and enclosed as **Annexure-I**.

WHEREAS, the updated list of manufacturers to whom CPCB has issued above mentioned certificates is available on the E-Certification portal at http://plastic.cpcb.gov.in/compostable/dashboard ; and

WHEREAS, details related to these manufacturers along with the copy of issued certificate have been regularly forwarded to your office; and

WHEREAS, CPCB has developed SOP for Quick Verification Tests to distinguish Compostable Plastics from Conventional Plastics and the same is uploaded on CPCB website at https://cpcb.nic.in/uploads/plasticwaste/SOP_for_quick_identification.pdf and enclosed as **Annexure-II;** and

WHEREAS, as per provision 11(1(c)) of PWM Rules, 2016 (as amended), each plastic carry bag and multilayered packaging shall have "*name and registration certificate number for producer or importer or brand owner generated through centralized online portal specified in Schedule II for plastic packaging with effect from 1 January, 2025 and number of certificate issued under clause (h) of sub-rule (4) in case of plastic sheet or like used for packaging and plastic packaging as well as carry bags commodities made of compostable plastic, as applicable*"; and

WHEREAS, as per provision 11(1(d)) of PWM Rules, 2016 (as amended), each plastic carry bag and multilayered packaging shall have *name and certificate number issued under clause (h) of sub-rule 4 in case of plastic sheet or like used for packaging and plastic packaging as well as carry bags and commodities made of biodegradable plastic; and*

WHEREAS, in accordance with section 2.7(iv) of SOP, field verification of the units shall be carried out by SPCB/PCC covering at least 10% of the units in their States/UTs biannually as per the prescribed format (**Annexure-V** of SOP); and

WHEREAS, in accordance with section 2.7(vi) of SOP, State Boards are further required to carry out the market survey to ensure availability of certified compostable carry bag at the consumer end; and

WHEREAS, in accordance with section 2.7(vii) of SOP, SPCB/PCCs are required to submit the six-monthly compliance report in the prescribed format of above inspection and market survey to CPCB as per the prescribed format (**Annexure-VI** of SOP); and

WHEREAS, vide letter dated 04.03.2021 CPCB has issued directions to all SPCB/PCCs which included the following directions:

a. To complete field verification of all units located in your state/UT by March 31, 2021.Subsequently, field verification of 10% of the units located in your states to be conducted every six months.
b. To carry out a market survey to ensure the availability of certified compostable bags in your state/UT.
c. To verify the six-monthly report submitted by Manufacturers/sellers.
d. To submit the six-monthly compliance report in the prescribed format (inclusive of (a) - (c) above) to CPCB.

WHEREAS, as per the information provided by your office,

- There were no manufacturers or sellers of compostable plastics in your jurisdiction. (for Mizoram, Chandigarh, Sikkim, Odisha, Nagaland, Bihar, Tripura)
- Inspection of ... unit conducted and out of ... , .. units were found to be operational and complying. (for MP, Kerala, Puducherry, Telangana, Delhi).
- Inspection is under process/ to be conducted by concerned ROs. However, no further information has been provided in this matter. (for HP, Chhattisgarh, Rajasthan and Maharashtra)
- However, no information has been provided on this matter. (for remaining states/UTs)

WHEREAS, CPCB has received complaints indicating that several compostable plastic manufacturing units are in non-compliance with the Plastic Waste Management Rules, 2016 (as amended), and are also violating the conditions of the compostable plastics certificates issued by CPCB.

WHEREAS, in accordance with section 2.6(ii) of SOP, CPCB is issuing one time final certificate to compostable plastic manufacturer and hence monitoring of the units is to be strengthened to ensure compliance with the stipulated conditions; and

NOW, THEREFORE, in view of above and in exercise of powers vested under Section 5 of EPA, the following directions are issued for compliance.

a. To conduct inspection of all compostable plastic manufacturing units located in your state/UT. Necessary assistance may be sought from CIPET, if required.
b. Subsequently, conduct field verification of 10% of the units located in your State/UT every six months as per SOP.

You are required to confirm receipt of this direction and submit action taken report to this office by November 30, 2024.

(Tanmay Kumar)
Chairman

Copy to: -

1. The Additional Secretary
   Ministry of Environment, Forests & Climate Change
   Indira Paryavaran Bhawan, Jor Bagh Road,
   Delhi New -110003 : For kind information, please

2. Regional Directorates, CPCB : For follow up with concerned SPCBs/PCCs in your jurisdiction, please

3. The Director,
   Central Institute of Petrochemicals Engineering & Technology : For technical assistance please

4. Incharge, IT Division : For uploading a copy of these directions on CPCB website, please

(Bharat Kumar Sharma)
Member Secretary

O/C

Information Provided from SPCBs:-

S.No.	State	Information
1	Mizoram	No Compostable manufacturers/ Sellers unit.
2	Chandigarh	No compostable unit. In survey compostable carry bags are available in Chandigarh.
3	Sikkim	No Compostable manufacturers/ Sellers unit.
4	Odisha	No Compostable manufacturers/ Sellers unit. In survey compostable carry bags are available in Odisha.
5	Nagaland	No Compostable manufacturers/ Sellers unit.
6	Madhya Pradesh	one unit in MP & not in operation at present. Survey regarding availbility compostalbe plastic may be conducted -- an independent agency.
7	Himachal Pradesh	2 unit availble field visit to be conducted.
8	Bihar	No Compostable manufacturers/ Sellers unit.
9	Kerala	4 Units in the state Bianneal report submitted
10	Chhattisgarh	Matter has been conveyed to concern office.
11	Puducherry	One unit inspected
12	Tripura	No Compostable manufacturers/ Sellers unit.
13	Maharashtra	matter has been conveyed to concern RO.
14	Telangana	Inspected 5 units
15	Rajasthan	Field visit to be carried out of 3 units
16	Delhi	7 unit as per list out of which only 2 were currently manufacturing compostable bags along with other plastic

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार.
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVT. OF INDIA.

F. No. CP-20/35/2023-UPC-II-HO-CPCB-HO Dated: 11 .11.2024

To,

The Principal Secretary
All State UDDs

Sub: Directions Under Section 5 of the Environment (Protection) Act, 1986 for Implementation of ban on Single Use Plastic (SUP)-Reg.

WHEREAS, the Ministry of Environment, Forest & Climate Change (MoEF&CC) notified the PWM Rules, 2016, in exercise of the powers conferred under section 3,6, & 25 of the Environmental (Protection) Act, 1986 Vide Notification No. G.S.R. 320 (E) dated March 27, 2016; and

WHEREAS, MoEF&CC issued Notification, dated August 12, 2021 banned identified SUP items and prescribed minimum thickness of carry bag with effect from July 01, 2022; and

WHEREAS, as per Rule 4(2) of PWM Rules, 2016 (as amended), "The manufacture, import, stocking, distribution, sale and use of following single use plastic (SUP), including polystyrene and expanded polystyrene, commodities shall be prohibited with effect from the 1st July, 2022; and

a. *Ear buds with plastic sticks, plastic sticks for balloons, plastic flags, candy sticks, ice-cream sticks, polystyrene [Thermocol] for decoration.*

b. *Plates, cups, glasses, cutlery such as forks, spoons, knives, straw, trays, wrapping or packing films around sweet boxes, invitation cards, and cigarette packets, plastic or PVC banners less than 100 microns, stirrers; and*

WHEREAS, as per Rules 4(1)(c) of PWM Rules, 2016 (as amended) "Carry bag made of virgin or recycled plastic, shall not be less seventy-five microns in thickness with effect from the 30th September,2021and one hundred and twenty (120) microns in thickness with effect from 31st December, 2022; and

WHEREAS, as per Rule 4 (d) of the PWM Rules, plastic sheet or like, which is not an integral part of multi-layered packaging and cover made of plastic sheet used for packaging, wrapping the commodity shall not be less than fifty microns in thickness except where the thickness of such plastic sheets impair the functionality of the product; and

WHEREAS, as per Rule 12 (1) of PWM Rules, 2016 (as amended), The Central Pollution Control Board, State Pollution Control Board and Pollution Control

Committee in respect of a Union territory shall be the authority for enforcement of the provisions of these rules; and

WHEREAS, as per Rule 12 (2) of PWM Rules, 2016 (as amended), The concerned Additional Chief Secretary or Principal Secretary or Secretary in charge of the Department of the State Government or a Union territory Administration responsible for municipal administration shall be the authority for enforcement of the provisions of these rules relating to waste management by waste generator, restriction or prohibition on use of plastic carry bags, plastic sheets or like, covers made of plastic sheets and plastic packaging and items prohibited under rule 4 of these rules in the urban areas of the State or a Union territory; and

WHEREAS, as per Rule 12 (3) of PWM Rules, 2016 (as amended), The concerned Additional Chief Secretary or Principal Secretary or Secretary in charge of the Department of the State Government or a Union territory Administration responsible for Panchayati Raj Institutions shall be the authority for enforcement of the provisions of these rules relating to waste management by the waste generator, restriction or prohibition on use of plastic carry bags, plastic sheets or like, covers made of plastic sheets and plastic packaging and items prohibited under rule 4 of these rules in the rural area of the State or a Union territory; and

WHEREAS, CPCB issued Direction dated 01-2-2022 to all SPCBs/PCCs to ensure compliance of notification published by MoEF&CC dated 12-08-2021 in line with comprehensive action plan; and

WHEREAS, for effective monitoring of ban on identified single use plastic items and plastic waste management in the country, CPCB developed SUP Compliance Monitoring portal and SUP field inspection app to facilitate the structured inspection and monitoring by state boards and local bodies, and SUP Public Grievance App to ensure citizen participation for effective enforcement of ban; and

WHEREAS, CPCB issued Directions dated 30-06-2022 to all SPCBs/PCCs and UDDs to monitor compliance through SUP Compliance Monitoring App; and

WHEREAS, special inspection drive was conducted from October to December 2022 with focus on enforcement on street vendors, local shops, wholesale markets etc. by CPCB/SPCB/PCC with State UDD; and

WHEREAS, CPCB had prepared Standard Operating Procedure (SOP) with the prime objective to break the supply chain of SUP items and also issued directions dated 01-03-2023 to all SPCBs/PCCs for joint inspections with State UDD as per SOP through Field inspection app and file the inspection report on the SUP compliance monitoring portal till August 2023; and

WHEREAS, CPCB further issued Directions dated 20.11.2023 & 16.02.02024 to all SPCBs/PCCs and UDDs for conduction of exhaustive inspection drives at regular intervals in the area under your jurisdiction along with State UDDs to identify manufacturers and suppliers of banned SUP items and take strict action against the violating entities; and

WHEREAS, it is observed that details w.r.t only xxx inspections conducted and uploaded on the SUP Compliance Monitoring Portal. (Details at Annexure-I); and

WHEREAS, it is observed that fine of only Rs..xxx has been imposed and xxx kg of plastic items seized since xxx as per information uploaded on the SUP Compliance Monitoring Portal ; (Details at Annexure-I); and

WHEREAS, it is observed that only xxx no. of complaints have been lodged on the SUP Grievance redressal App and only xxx have been resolved by the concerned authorities; (Details at Annexure-II); and

WHEREAS, continual use and sale of Single Use Plastic Items is being observed specially in informal sector including local shops/ street vendors; and

NOW, THEREFORE, in view of above and in exercise of powers vested under Section 5 of Environment (Protection) Act, 1986 to the Chairman, CPCB following directions in continuation of Directions dated 1.2.2022, 30.6.2022, 01.03.2023, 17.05.2023, 20.11.2023 & 16.02.2024 are issued for compliance:

1. To conduct SUP ban enforcement drive jointly with State UDD as per the SOP prepared by CPCB for four days a month during the period October, 2024-January 2025. The schedule of inspection is to be finalized by the concerned SPCB/PCC in consultation with State UDD and is to be completed by 25th of every month. The Police force may be deployed during the inspection drive as per requirement.
2. To conduct the inspections with focus on street vendors, local shops, wholesale markets, interstate borders, industries, bus depots, railway stations, airports and such other crowded locations.
3. To register all the concerned field officers (SPCB/PCC/State UDD) on SUP Compliance monitoring portal.
4. To conduct the inspections through Field inspection app and file the inspection report on the SUP compliance monitoring portal. Violations & details of action taken w.r.t Commercial establishment shall be reported by State UDD and violation & details of action taken w.r.t industries shall be reported by the SPCB/PCC.
5. To include information w.r.t. supplier of SUP items (for commercial users), plastic raw material suppliers (for banned SUP producers) and SUP producers (for plastic waste recyclers making granules) in the inspection report.
6. To provide details w.r.t. the action taken against the defaulters (Seizure/ challan/ fine levied/ cancellation of permission granted for Commercial entities & Seizure/ Show Cause Notice/ Closure/ environmental compensation levied in case of banned SUP producers) through SUP field inspection App.
7. To promote the usage of the SUP Public Grievance App by citizens in your jurisdiction.

8. To take necessary action to resolve all the grievances received on the SUP public grievance App within 7 days in your jurisdiction.

You are requested to take necessary action to ensure compliance of above directions.

Yours faithfully,

(Tanmay Kumar)
Chairman

Copy to: -

1. The Additional Secretary
   Ministry of Environment, Forests & Climate Change
   Indira Paryavaran Bhawan, Jor Bagh Road,
   Delhi New -110003
   : For kind information, please

2. Regional Directorates, CPCB
   : For follow up with concerned authorities in your jurisdiction, please

3. Incharge, IT Division
   : For uploading a copy of these directions on CPCB website, please

(Bharat Kumar Sharma)
Member Secretary

o/c

Annexure-II

S.No	STATE	TOTAL COMPLAINTS RECEIVED	RESOLVED BY AUTHORITY	ESCALATED TO HIGHER OFFICIAL
1	ANDAMAN AND NICOBAR ISLANDS	0	0	0
2	ANDHRA PRADESH	133	21	4
3	ARUNACHAL PRADESH	13	0	1
4	ASSAM	94	2	2
5	BIHAR	442	135	6
6	CHHATTISGARH	80	0	11
7	CHANDIGARH	93	0	34
8	DELHI	1337	965	3
9	DNH&DD	9	0	9
10	GOA	45	0	3
11	GUJARAT	352	88	1
12	HIMACHAL PRADESH	34	16	0
13	HARYANA	1677	1517	0
14	JAMMU AND KASHMIR	14	0	6
15	JHARKHAND	65	6	0
16	KERALA	272	4	5
17	KARNATAKA	678	276	5
18	LAKSHADWEEP	2	0	1
19	MEGHALAYA	86	0	5
20	MAHARASHTRA	998	522	25
21	MANIPUR	0	0	0
22	MADHYA PRADESH	251	46	0
23	MIZORAM	0	0	0
24	NAGALAND	7	0	0
25	ODISHA	41	0	1
26	PUNJAB	156	12	0
27	PUDUCHERRY	31	17	5
28	RAJASTHAN	285	149	0
29	SIKKIM	26	18	0
30	TAMIL NADU	304	121	4
31	TRIPURA	1	0	1
32	UTTARAKHAND	368	231	0
33	UTTAR PRADESH	1097	279	1
34	WEST BENGAL	183	37	1
35	TELANGANA	88	54	0
36	LADAKH	0	0	0
	TOTAL	**9262**	**4516**	**134**

Annexure-I

S.No	State	No. of Inspection by SPCB/PCC	No. of inspection by ULB	Total	Quantity of SUP Item Seized(KG)	Fine Imposed(Rs)
1	ANDAMAN AND NICOBAR ISLANDS	0	94	94	13	5000
2	ANDHRA PRADESH	0	219	219	22.4	9800
3	ARUNACHAL PRADESH	0	0	0	0	0
4	ASSAM	3	5	8	52	7000
5	BIHAR	0	32	32	85.42	15700
6	CHHATTISGARH	19	60	79	69	19000
7	CHANDIGARH	9	3	12	19.1	17400
8	DELHI	1787	933	2720	3367.73	653532
9	DNH&DD	4	29	33	13.4	1300
10	GOA	0	0	0	0	0
11	GUJARAT	0	60	60	0	0
12	HIMACHAL PRADESH	0	478	478	0.58	6510
13	HARYANA	0	2	2	26	501
14	JAMMU AND KASHMIR	22	0	22	10.5	900
15	JHARKHAND	0	4	4	51	2000
16	KERALA	0	0	0	0	0
17	KARNATAKA	0	49	49	5.35	1004599.99
18	LAKSHADWEEP	0	4	4	0	0
19	MEGHALAYA	0	0	0	0	0
20	MAHARASHTRA	1139	479	1616	4344.77	5031631.96
21	MANIPUR	0	0	0	0	0
22	MADHYA PRADESH	0	32	32	61.76	15900
23	MIZORAM	0	119	119	2031.23	76000
24	NAGALAND	0	0	0	0	0
25	ODISHA	0	0	0	0	0
26	PUNJAB	0	0	0	0	0
27	PONDICHERRY	0	1250	1250	15371.1	145344.2
28	RAJASTHAN	1	20	21	16.5	3200
29	SIKKIM	0	6	6	127.42	7600
30	TAMIL NADU	0	8	8	66.33	21300
31	TRIPURA	0	1	1	0	0
32	UTTARAKHAND	0	170	170	329.27	233403
33	UTTAR PRADESH	0	147	147	76.69	93150
34	WEST BENGAL	20	62	82	37.01	1501
35	TELANGANA	0	0	0	0	0
36	LADAKH	0	0	0	0	0
	TOTAL	**3004**	**4266**	**7268**	**26197.56**	**7372273.15**

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVT. OF INDIA

File No. CP-20/117/2021-UPC-II-HO-CPCB-HO-Part(7) Date: 04-07-2024

To,

The Chairman
All SPCBs/PCCs

Sub: - Direction under Section 5 of the EPA, 1986 regarding Characterization & Assessment of Plastic Waste by Local Bodies, District Panchayats, SPCBs & PCCs as per methodology developed by CPCB

Whereas, the Ministry of Environment, Forest & Climate Change (MoEF&CC) notified the PWM Rules, 2016, in exercise of the powers conferred under section 3,6, & 25 of the Environmental (Protection) Act, 1986 Vide Notification No. G.S.R. 320 (E) dated March 27, 2016; and

Whereas, MoEF&CC, vide Notification dated August 12, 2021 banned identified SUP items and prescribed minimum thickness of carry bag with effect from July 01, 2022; and

Whereas, as per Rule 4(2) of PWM Rules, 2016 (as amended), *"The manufacture, import, **stocking, distribution, sale and use** of following single use plastic (SUP), including polystyrene and expanded polystyrene, commodities shall be prohibited with effect from the 1st July, 2022:*

(a) Ear buds with plastic sticks, plastic sticks for balloons, plastic flags, candy sticks, ice-cream sticks, polystyrene [Thermocol] for decoration.

(b) Plates, cups, glasses, cutlery such as forks, spoons, knives, straw, trays, wrapping or packing films around sweet boxes, invitation cards, and cigarette packets, plastic or PVC banners less than 100 micron, stirrers; and

Whereas, as per Rules 4(1)(c) of PWM Rules, 2016 (as amended), *"Carry bag made of virgin or recycled plastic, shall not be less seventy-five microns in thickness with effect from the 30th September,2021 and one hundred and twenty (120) microns in thickness with effect from 31st December, 2022"*; and

Whereas, as per Rule 4(1)(d) of the PWM Rules, *"plastic sheet or like, which is not an integral part of multi-layered packaging and cover made of plastic sheet used for packaging, wrapping the commodity shall not be less than fifty microns in thickness except where the thickness of such plastic sheets impairs the functionality of the product"*; and

Whereas, Guidelines on Extended Producer Responsibility for Plastic Packaging and commodities made from compostable plastics or biodegradable plastics were notified by MoEF&CC on February 16, 2022 in Schedule – II of 4th amendment of Plastic Waste Management Rules, 2018 (as amended); and

Whereas, as per Provision 5.1 of the Schedule-II of PWM Rules (as amended), "*The following plastic packaging categories are covered under Extended Producer Responsibility:*

i. *Category I: Rigid plastic packaging;*
ii. *Category II: Flexible plastic packaging of single layer or multilayer (more than one layer with different types of plastic), plastic sheets or like and covers made of plastic sheet, carry bags, plastic sachet or pouches;*
iii. *Category III: Multi-layered plastic packaging (at least one layer of plastic and at least one layer of material other than plastic);*
iv. *Category IV: Plastic sheet or like used for packaging as well as carry bags & commodities made of compostable plastics;*
v. *Category V: Plastic sheet or like used for packaging as well as carry bags and commodities made of biodegradable plastics*"; and

Whereas, as per Rule 6(5) of PWM Rules, 2018 (as amended), "*The local body shall undertake assessment of plastic waste generated, including plastic waste existing in dump sites, by the 30th June of every year and also estimate the quantity of plastic waste to be generated in following five-year period*"; and

Whereas, as per Rule 6(8) of PWM Rules, 2018 (as amended), "*The local body shall include in the annual report the following details on plastic waste management, namely: -*

i. *Plastic waste generated, including plastic waste existing in dump sites, in a year;*
ii. *Plastic waste management infrastructure available for collection, segregation, processing;*
iii. *Projection of plastic waste to be generated;*
iv. *Status on framing and implementation on byelaws;*
v. *Actions taken action to prevent stocking, distribution, sale and usage of prohibited Single Use Plastic items*"; and

Whereas, as per Rule 7A(1) of PWM Rules, 2018 (as amended), "*The Panchayat at District level shall undertake assessment of plastic waste generated, including plastic waste existing at dump sites, by the 30th June of every year for rural areas of the district and also estimate the quantity of plastic waste to be generated in following five-year period*"; and

Whereas, as per Rule 7A(3) of PWM Rules, 2018 (as amended), "*The Panchayat at District Level shall include in the annual report the following details on plastic waste management, namely: -*

i. *Plastic waste generated, including plastic waste existing at dump sites, in a year;*

ii. *Plastic waste management infrastructure available for collection, segregation, processing;*
iii. *Projection of plastic waste to be generated;*
iv. *Status on framing and implementation on byelaws;*
v. *Actions taken action to prevent stocking, distribution, sale and usage of banned Single Use Plastic items*"; and

Whereas, as per Rule 17 (4) of PWM Rules, 2018 (as amended), "*Every urban local body and Panchayat at District Level shall prepare and submit online an annual report in Form –V (A& B) to the Urban Development Department and to Rural Development Department, respectively, and also to the State Pollution Control Board or Pollution Control Committee concerned by the 30th June every year*"; and

Whereas, as per Rule 17 (6) of PWM Rules, 2018 (as amended), "The *State Pollution Control Board or Pollution Control Committee shall prepare and submit online an annual report in Form VI to the Central Pollution Control Board on the implementation of these rules by the 31st July of every year"; and*

Whereas, as per the aforementioned formats for filing Annual Reports, Assessment & Characterization of plastic waste by the Local Bodies, District level Panchayats, SPCBs & PCCs, is to be carried out as per methodology developed by CPCB; and

Whereas, CPCB had prepared draft Standing Operating Procedure (SOP) for assessment of quantity of plastic waste generated and its characterization, with a focus on Single Use Plastic and Categories of Plastic Packaging as per the PWM Rules; and

Whereas, the draft Standard Operating Procedure (SOP) prepared by the Central Pollution Control Board (CPCB) was circulated during the period February 11, 2024 to March 12, 2024 for comments; and

Whereas, the SOP has been finalised incorporating the comments and suggestions from various stakeholders. The same is enclosed at **Annexure-I** and is also available at CPCB's website (https://cpcb.nic.in/uploads/plasticwaste/SOP_PWM_24062024.pdf); and

Now, therefore, in view of the above direction and in exercise of powers vested under Section 5 of Environment (Protection) Act, 1986 to the Chairman CPCB, following directions are issued for compliance:

1. To direct the Local Bodies and District Panchayats in your jurisdiction to carry out Assessment & Characterization of plastic waste for the purpose of reporting in the Annual Report, as per provision of PWM Rules, in accordance with the SOP for Assessment & Characterization of Plastic Waste developed by CPCB.

2. To provide necessary assistance & impart training to the Local Bodies and District Panchayats for implementation of Point (1) above.
3. To carry out assessment & characterization of plastic waste in at least two Local Bodies and District Panchayat in association with the concerned Authorities.
4. To monitor the implementation of this SOP by the concerned stakeholders in your jurisdiction.
5. To validate the data submitted by the Local Bodies and District Panchayats as per the methodology stipulated in the SOP.
6. To carry out Assessment & Characterization of plastic waste in your jurisdiction for the purpose of reporting in the Annual Report, as per provision of PWM Rules, in accordance with the methodology stipulated in the SOP.

You are hereby directed to take necessary action for compliance of aforesaid Directions and submit Action Taken Report to this office within 15 days of issuance of the Direction.

13/4/17

(Tanmay Kumar)
Chairman

Copy to:

1.	Shri Naresh Pal Gangwar Additional Secretary, Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jorbagh Road, New Delhi – 110 003	:	For kind information, please
2.	The Regional Director All CPCB Regional Directorates	:	For follow up with concerned SPCB/PCCs in your jurisdiction, please
3.	DH-IT, CPCB	:	For uploading a copy of these directions on CPCB website, please

Bharat Kumar Sharma
Member Secretary

O/C

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
MINISTRY OF ENVIRONMENT FOREST & CLIMATE CHANGE GOVT OF INDIA

F.No.CP-20/8/2024-UPC-II-HO-CPCB-HO

March 14, 2024

To,

The Chairman
SPCBs/PCCs - All States/UTs

Sub: - Directions under Section 5 of the EPA, 1986 regarding compliance of various provisions under Schedule-II of Plastic Waste Management Rules, 2016, i.e., Guidelines on Extended Producer Responsibility (EPR)

WHEREAS, the Ministry of Environment, Forest & Climate Change (MoEF&CC) has notified Plastic Waste Management Rules, 2016, in exercise of the powers conferred under sections 3, 6 & 25 of the Environment (Protection) Act, 1986 vide Notification No. G.S.R 320 (E) dated March 18, 2016; and

WHEREAS, Guidelines for Extended Producers Responsibility for Plastic packaging were notified by MoEF&CC on February 16, 2022 as Schedule-II of the Plastic Waste Management Rules, 2016; and

WHEREAS, as per Section 6.1(a) of the EPR Guidelines, *"The following entities shall register on the centralized portal developed by Central Pollution Control Board namely: - (i) Producer (P); (ii) Importer (1); (iii) Brand owner (BO), (iv) Plastic Waste Processor engaged in (a) recycling, (b) co-processing (c) waste to energy, (d) waste to oil, and (e) industrial composting;* and

WHEREAS, as per section 6.2 of the above Guidelines, "*The entities covered under clause 6.1 shall not carry any business without registration obtained through online Centralized Portal developed by Central Pollution Control Board*"; and

WHEREAS, as per section 10.1 of the above Guidelines, "*The Producers, Importers & Brand Owners shall have to register through the online centralized portal developed by Central Pollution Control Board. The certificate of registration shall be issued using the portal*; and

WHEREAS, as per section 10.6 of the above Guidelines, *"The Producers, Importers & Brand-Owners shall file annual returns on the plastic packaging waste collected and processed towards fulfilling obligations under Extended Producer Responsibility with the Central Pollution Control Board or concerned State Pollution Control Board or Pollution Control Committee as per pro forma prescribed by Central Pollution Control Board by the 30th June of the next financial year. Information on the reuse and/or recycled content used for packaging purposes will also be provided. The details of the*

registered recyclers from whom the recycled plastic has been procured will also be provided"; and

WHEREAS, as per Section 11.1 of the EPR Guidelines, *"All plastic waste processors shall have to register with concerned State Pollution Control Board or Pollution Control Committee in accordance with provisions of 13(3) of Plastic Waste Management Rules, 2016 on the centralized portal developed by Central Pollution Control Board. Central Pollution Control Board shall lay down uniform procedure for registration within three months of the publication of these guidelines";* and

WHEREAS, as per Section 11.2 of EPR Guidelines, *"The Plastic waste processors shall submit annual returns after end of every financial year by 30th April of the next financial year on the quantity of plastic waste processed category-wise as per prescribed pro forma on the centralized portal developed by Central Pollution Control Board";* and

WHEREAS, CPCB has developed the Centralized EPR portal for registration of Producers, Importers and Brand-owners (PIBOs) & Plastic Waste Processors (PWPs) that has been formally launched on April 05, 2022; and

WHEREAS, 36228 PIBOs (Producers: 3988, Importer: 29807 and Brand Owners: 2433) and 2351 Plastic Waste Processors (PWPs) have already been registered on the EPR portal; and

WHEREAS, it has been observed that several PIBOs/PWPs are continuing with their operations without obtaining registration on the Centralized EPR Portal, which is in violation of Plastic Waste Management Rules, 2016, as amended; and

WHEREAS, in the matter of CWP No. 2369 of 2018 titled 'Suleman and others vs. Union of India', vide order dated 01.03.2024 (**Annexure I**), the Hon'ble High court of Himachal Pradesh has made the following observations:

> *"However, we find that very few industries have been registered and, therefore, have impressed upon her to collect the relevant data of the industries registered in the various States and U.T.s from the relevant authorities, so that industries falling under the PWM Rules essentially get registered under the PWM Rules, 2016, be it with the Central Pollution Control Board or else the respective State Pollution Control Boards, as the case may be. The Officer has assured us that the needful shall be done before the next date of hearing."*

WHEREAS, CPCB has issued letters to department of Industries/State Authorities dated 06.03.2024 **(Annexure - II)** to provide the list of industries involved in introducing/processing of plastic packaging under their jurisdiction and to further ensure that all such entities register themselves on the centralized EPR portal in compliance of the PWM Rules, 2016, as amended; and

WHEREAS, CPCB has issued a public notice dated 14/03/2024 **(Annexure III)** informing all PIBOs & PWPs to register on the centralized EPR portal on or before 31.03.24; and

NOW THEREFORE, in compliance of above and in exercise of powers vested under Section 5 of Environment (Protection) Act, 1986 to the Chairman, CPCB, the following directions are hereby issued to all SPCBs/PCCs for compliance:

a. To issue a public notice on the SPCBs/PCCs website informing all PIBOs & PWPs in your jurisdiction to register on the centralized EPR portal on or before 31.03.24.

b. To publish the aforesaid notice in the regional newspaper in English as well as in local languages.

c. To follow-up with the department of Industries / State authorities to provide necessary information as per letter dated 06.03.2024 **(Annexure II)** to CPCB.

You are hereby directed to take necessary action for compliance of aforesaid directions and submit the action taken report to this office within 10 days of receipt of this direction.

18/3/24

(Tanmay Kumar)
Chairman

Copy to:

1. Additional Secretary, HSMD, Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan Jorbagh Road, New Delhi – 110 003 : for kind information, please

2. Regional Directors, All CPCB Regional Directorates : for kind information and follow up with SPCBs/PCCs in your jurisdiction

3. DH (IT) : for uploading on CPCB website, please

(Bharat Kumar Sharma)
Member Secretary

O/C

Annexure I

Suleman vs. Union of India and others a/w connected matters.
CWP No. 2369 of 2018 a/w CWPIL No. 269 of 2017, CWP Nos. 1074 of 2019, 3334 of 2021, CWPIL Nos. 32, 42, 56 of 2021, CWP No. 3511 of 2022 and CWPIL No. 4 of 2022.

01.03.2024. Present: Mr. Deven Khanna, Advocate, (through video-conferencing) for the petitioners, in CWP No.2369 of 2018.

Mr. Shekhar Badola, Advocate vice Mr. Parav Sharma, Advocate, for the petitioner, in CWP No. 1074 of 2019.

None for the petitioner in CWP No. 3334 of 2021.

Mr. Suneet Goel, Advocate, as Amicus Curiae, for the petitioner, in CWPIL No. 269 of 2017.

Mr. K.B. Khajuria, Advocate, for the petitioner, in CWP No. 3511 of 2022 and for respondent No.6-Central Pollution Control Board, in CWP No.2369 of 2018.

Court on its own motion in CWPIL Nos. 32, 42 and 56 of 2021.

Mr. Anup Rattan, Advocate General with Mr. I.N. Mehta, Senior Additional Advocate General, Mr. Ramakant Sharma, Mr. Navlesh Verma, Ms. Sharmila Patial, Additional Advocate Generals and Mr. J.S.Guleria, Deputy Advocate General, for the respondents-State.

Mr. Balram Sharma, DSGI, for Union of India and for respondent No.4-Central Pollution Control Board in CWP No. 3511 of 2022.

Mr. Pranjal Munjal, Advocate, for respondent No.8, in CWP No. 2369 of 2018 and CWP No. 1074 of 2019.

Mr. Lovneesh Kanwar, Senior Advocate with Mr. Tek Chand, Advocate, for M.C. Sarkaghat.

Mr. Tara Singh Chauhan and Mr. Maan Singh, Advocates, for respondent-H.P. Pollution Control Board, in CWP No. 2369 of 2018 and CWP No.1074 of 2019.

Mr. Lalit K. Sharma, Advocate, for respondent No. 4, in CWPIL No. 32 of 2021.

Mr. Mukesh Sharma, Advocate vice Mr. Virbahadur Verma, Advocate, for respondent No.2, in CWPIL No. 32 of 2021, for respondent No.1, in CWPIL No.42 of 2021 and for respondent No.3 in CWP No. 3511 of 2022.

Mr. Naveen K. Bhardwaj, Advocate, for M.Cs. Kullu, Manali and Nagar Panchayat, Bhuntar, Distt. Kullu, H.P., in CWP No. 2369 of 2018.

Mr. H.S.Rangra, Advocate, for M.C., Mandi, in CWP No. 2369 of 2018.

Mr. Ajay K. Chauhan, Advocate, for M.C. Palampur, in CWP No. 2369 of 2018.

Mr. Adarsh K. Vashista, Advocate, for M.Cs. Chamba, Nalagarh, Nagrota Bagwan, Nurpur, Shahpur, Jawalamukhi and N.P., Jawali.

Mr. Mukul Sood, Advocate, for M.Cs Shimla and Dharamshala.

Mr. Ajay Kumar Dhiman, Advocate, for M.C., Paonta Sahib, District Sirmaur, H.P.

Mr. Janmajai Chauhan, Advocate vice Mr. Sunil Mohan Goel, Advocate, for respondent No.5 in CWPIL No. 4 of 2022.

Ms. Divya Sinha, Director & Head UPC II Div., Central Pollution Control Board, in person.

Mr. Balram Sharma, learned Deputy Solicitor General of India, states that necessary affidavit in terms of order dated 12.01.2024 has been filed in the Registry on 29.02.2024, however, the same is not on record. Be traced and placed on record.

2. In compliance to our order dated 12.01.2024, Ms. Divya Sinha, Director & Head UPC II Div., Central Pollution Control Board, is present in person. We have interacted with the Officer, who has informed us about the steps taken with regard to registration and implementation of the PWM Rules,

2016. However, we find that very few industries have been registered and, therefore, have impressed upon her to collect the relevant data of the industries registered in the various States and U.T.s from the relevant authorities, so that industries falling under the PWM Rules essentially get registered under the PWM Rules, 2016, be it with the Central Pollution Control Board or else the respective State Pollution Control Boards, as the case may be. The Officer has assured us that the needful shall be done before the next date of hearing.

3. On 11.01.2024, the Court passed the following order:

> "Central Pollution Control Board has filed certain instructions. The counsel for the petitioner prays for to go through the said instructions.
>
> Learned Advocate General has placed on record instructions which goes to indicate that two sites have been proposed for exchange to the petitioner in CWP No. 2369 of 2018. Let petitioner examine the aforesaid sites and accordingly apprise this Court by tomorrow.
>
> For these limited purpose(s), list the matter on **12th January, 2024.**
>
> We find from the affidavit filed by the various Urban Local Bodies that they have been facing certain difficulties in implementing the environmental laws more particularly with regard to the solid waste management. More than five years have passed, but not much progress has been made in this regard despite the majority of petitions have been clubbed together.
>
> In such circumstances, we direct the respondents-State to constitute a Multi Member Committee which will look into the grievances and difficulties pointed out by

executive officers and Secretaries of the various Local Urban Bodies in implementing the environmental laws. Such committee shall comprise of Director Urban (Head), one member of Pollution Control Board, one member of Environmental Department, one member of the Revenue Department and One member of the Forest Department along with concerned Secretary of the District Legal Services Authority. In addition to the aforesaid members, the counsel for the petitioner in CWP No. 2369 of 2018 and any other Advocate(s), who is/are willing to participate in the meeting, is/are also permitted to participate and the Committee is directed to give advance notice of at least 24 hours of the meeting to the counsel(s).

This Multi Member Committee shall meet at least once a week and it shall be open to the Committee to hold meetings either online or off line or hybrid mode. After examining the various affidavits filed by the various authorities, meaningful suggestions shall be carved out by the Committee within a period of four weeks and thereafter these shall be referred to the Chief Secretary to the Government of Himachal Pradesh, who shall then take a call and issue necessary directions to the authorities concerned and file a status report before this Court. For this purpose, the case be listed on **1st March, 2024.** In addition, the Committee shall also consider the recommendations and the reports submitted by the Advocate Committee along with affidavits submitted by the Pollution Control Board as also the suggestions made by the petitioner in CWP No.2369 of 2018."

4. The State is directed to place on record the minutes of the meeting as also the proposed action which they intend to take pursuant to the deliberations held in the meeting(s) before the next date of hearing.

5. List on **21.03.2024**. In the meanwhile, all the

U.L.Bs of the State Government are directed to get themselves registered with the Centralized EPR portal for Plastic Packaging and compliance affidavit to this effect be filed by the Director (Urban).

6. We are informed by the learned Advocate General that the petitioner has rejected both the sites shown to him pursuant to the directions of this Court. This aspect shall be considered on the next date of hearing.

7. The Officer present is exempted from physical appearance before this Court. However, she henceforth is permitted to appear through video-conferencing as and when required by this Court.

(Tarlok Singh Chauhan)
Judge

(Satyen Vaidya)
Judge

March 01, 2024.
(krt)

Annexure II

SPEED-POST / E-MAIL केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVT. OF INDIA

File No. CP-20/139/2021-UPC-II-HO-CPCB-HO Date: 06.03.2024

To,

Director/ Commissioner,
Department of Industries / State Authorities
(All States/UTs – As per list)

Sub: - Registration of Producers, Importers, Brand owners & Plastic Waste Processors as per Plastic Waste Management Rules, 2016, as amended - reg

Sir/Madam,

Central Pollution Control Board (CPCB) has developed the Centralized EPR Portal for Plastic Packaging for implementation of Extended Producer Responsibility (EPR) in accordance with the Guidelines on Plastic Packaging issued vide MoEFCC's Fourth Amendment to PWM Rules, 2016 dated February 16, 2022 (Annexure I).

As per the clause 6.1 of the EPR guidelines Producers, Importers, Brand owners (PIBOs) who introduce plastic packaging in the market and Plastic waste processors (PWPs) (recycling, co-processing, waste to energy, waste to oil, and industrial composting) have to register on the EPR portal.

Till date, 36228 PIBOs (Producers: 3988, Importer: 29807 and Brand Owner: 2433) and 2351 PWPs have been registered on the centralized EPR portal. Further, it has been observed that several such PIBOs/PWPs are continuing with their operations without obtaining registration on the Centralized EPR Portal, which is in violation of Plastic Waste Management Rules, 2016, as amended.

Further, vide order dated 01.03.2024 **in the matter of CWP No. 2369 of 2018 titled 'Suleman and others vs. Union of India'**, the Hon'ble High Court of Himachal Pradesh made the following observations **(Annexure II).**

"However, we find that very few industries have been registered and, therefore, have impressed upon her to collect the relevant data of the industries registered in the various States and U.T.s from the relevant authorities, so that industries falling under the PWM Rules essentially get registered under the PWM Rules, 2016, be it with the Central Pollution Control Board or else the respective State Pollution Control Boards, as the case may be. The Officer has assured us that the needful shall be done before the next date of hearing"

Contd.

In view of the above, it is requested a list of all such entities involved in introducing/processing of plastic packaging into the market may be provided to CPCB along with their address and email. It is further requested to ensure that all such entities register themselves on the centralized EPR portal in compliance of the PWM Rules, 2016, as amended. The aforementioned information be provided to CPCB within 10 days, to enable us to take further necessary action.

The matter be taken on priority being compliance of the Hon'ble High Court order.

This issues with approval of Competent Authority.

Yours sincerely,

(Divya Sinha)
Director & In charge, UPC-II

Copy for Information to: -

1. PS to CCB
2. AO to MS

(Divya Sinha)

o/c

State/UT	Address of Department of Industries/State Authorities
Andhra Pradesh	Commissioner of Industries, Government of Andhra Pradesh, 8th Floor, APIIC Towers, Auto Nagar, Mangalagiri, Guntur District Andhra Pradesh, Pin code: - 522503 Email:- apmsefcinds@gmail.com
Arunachal Pradesh	Director of Industries, Government of Arunachal Pradesh, Udyog Sadan, Itanagar Arunachal Pradesh Pin code: - 791111
Assam	Commissioner of Industries, Government of Assam, Udyog Bhawan, Bamuni Maidan, Industrial Estate, Guwahati, Assam, Pin Code: - 781021
Bihar	Director of Industries, Department of Industries, Govt of Bihar, 2Nd Floor, Vikas Bhawan, Bailey Road, Jawaharlal Nehru Marg, Patna, Bihar, 800015 Email:- Dir.Ind-Bih@Nic.In
Delhi	Commissioner of Industries, Government of Nct of Delhi, Plot No. 419, Patparganj Industrial Area, Delhi - 110092 Email:- delhiold@test.com
Himachal Pradesh	Director of Industries, Government of Himachal Pradesh, Udyog Bhavan, Bemloe, Shimla Himachal Pradesh Pincode:- 171001
Jammu & Kashmir	Director, Industries & Commerce, Government of Jammu & Kashmir, Civil Secretariat, Jammu - 180001 Email: Jkindcom@Gmail.Com

State/UT	Address of Department of Industries/State Authorities
Jharkhand	Director of Industries, Government of Jharkhand, 3Rd Floor, Nepal House, Doranda, Ranchi-834002, Jharkhand Email:- jhr-doi@nic.in
Karnataka	Director of Industries & Commerce, Department of Industries and Commerce, Government of Karnataka, 49, Khanija Bhavan, South Block, First Floor, Race Course Road, Bengaluru - 560001 Karnataka Email:- msefcblr22@gmail.Com
Kerala	Director of Industries & Commerce, Government of Kerala, Vikas Bhavan P.O, Thiruvananthapuram, Kerala - 695033
Madhya Pradesh	Commissioner of Industries, Government of Madhya Pradesh, 4Th Floor, Directorate of Industries, Vindhyachal Bhawan, Bhopal, Madhya Pradesh Pincode:- 462004 Email:- mp-msefc@mp.gov.In
Manipur	Director of Industries & Commerce, Government of Manipur Head office of Directorate of Trade, Commerce & Industries, Lamphelapt, Imphal West State:- Manipur Pincode:- 795001 Email:- dcimanipur@gmail.com
Mizoram	Director of Industries & Commerce, Government of Mizoram Department of Industries Government of Mizoram, Aizawl - 796190, Mizoram

State/UT	Address of Department of Industries/State Authorities
Punjab	Director of Industries Commerce, Government of Punjab, O/O General Manager, District Industries Centre, Mission Road, Malikpur, Pathankot State:- Punjab Pincode:- 145001 Email:- pathankot.msefc@gmail.Com
Tamil Nadu	Industries Commissioner and Director of Industries and Commerce, Department of Industries and Commerce, Government of Tamil Nadu, Sidco Corporate office Building, 3Rd Floor, Thiru-Vi-Ka Industrial Estate, Guindy, Chennai 600 032, Tamil Nadu
Tripura	Director of Industries & Commerce, Government of Tripura, Shilpa Udyog Bhawan, Directorate of Industries & Commerce, Khejurbagan, Agartala, Tripura (W) State:- Tripura Pincode:- 799006 Email:- industrytripura@gmail.com
Uttar Prdesh	Chairman, Uttar Pradesh Micro Small and Medium Enterprises, Facilitation Council, Sarvodaya Nagar, G.T. Road, Kanpur - 208005 Uttar Pradesh Email:- facilitation.council@gmail.Com
Pondicherry	Chairman-Cum-Director, Directorate of Industries & Commerce, Thattanchavady, Puducherry State:- Puducherry Pincode:- 605009 Email:- ind.pon@nic.In
Goa	Deputy Director (Industries), Industry Directorate, Trade and Commerce, Government of Goa, Udyog Bhawan, Panaji, Goa - 403 001. E-Mail: Dir-Indu.Goa@Nic.In

State/UT	Address of Department of Industries/State Authorities
A&N	Director Directorate of Industries, Udhyog Parishar, Middle Point, Port Blair State:- andaman and Nicobar Islands Pincode:- 744101 Email:- dirind.and@nic.In
odisha	Director Directorate of Industries, Killa Maidan, Buxi Bazar-753001 Cuttack, Odisha
daman & Diu	Director Department of Industries, District Industries Centre, Udyog Bhawan, 1St Floor, Bhenslore, Nani Daman State:- Daman and Diu Pincode:- 396210 Email:- dic-dd@nic.In
chandigarh	Director of Industries, Chandigarh Administration, 39- Industrial Area, Phase-II, Ram Darbar State:- Chandigarh Pincode:- 160001
Chhattisgarh	Director Directorate of Industries, Udyog Bhawan, Ring Road No.1.Telibandha Raipur, C.G. State:- Chhattisgarh Pincode:- 492001 Email:- dtic-directorate.cg@gov.In
Gujarat	Commissioner Office of MSME Commissionerate Block No. 1, 4Th Floor, Udyog Bhavan, Gandhinagar 382 010, Gujarat Pincode:- 382010 Email:- comm-msefc-gnr@gujarat.gov.in

State/UT	Address of Department of Industries/State Authorities
haryana	Director Directorate of Industries & Commerce, 1St Floor, 30 Bays Building, Sector17, Chandigarh Haryana - 134114 Email: Ipcharyana@Yahoo.Com Help@Hryindustries@Gmail.Com
LAKSHADWEEP	Director of Industries, Ut Administration of Lakshadweep, Kavaratti, Lakshadweep Pincode:- 682555
Maharashtra	Development Commissioner (Industries) Government of Maharashtra Directorate of Industries, New Administrative Building, 2Nd Floor, Madame Cama Road, Opp. Mantralaya, Mumbai – 400032 Email: didci@maharashtra.gov.In
Meghalaya	Director Commerce and Industries Department, Meghalaya 2Nd Floor, Administrative Building, Lower Lachumiere, Shillong-793001, Meghalaya Email:- industries-meg@gov.In
Nagaland	Director Directorate of Industries & Commerce, Kohima Nagaland Nagaland- 797001 Email:- industrynaga@gmail.com

State/UT	Address of Department of Industries/State Authorities
Rajashthan	Director Industries & Commerce Department Udhyog Bhawan Tilak Marg Jaipuir Rajasthan, Pincode:- 302001 Email:- indrajfc@rajasthan.gov.In
Sikkim	Director of Industries, Government of Sikkim, Gangtok Secretariat Annexe-1, S. T. Marg, Gangtok, Sikkim Pincode:- 737001
Telangana	Commissioner, Commissionerate of Industries Government of Telangana Chirag Ali Lane, Abids, Hyderabad, Telangana 500001
UTTARAKHAND	Director, Directorate of Industries, Uttarakhand Industrial Area, Patel Nagar, Dehradun, Uttarakhand Email:- mpr@doiuk.org
West Bengal	Director of Industries, West Bengal 4, Abanindranath Tagore Sarani, Kolkata-700016 Email:-adiat.di-wb@bangla.gov.in

Annexure III

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVT. OF INDIA

F. No. CP-20/8/2024-UPC-II-HO-CPCB-HO

March 14, 2024

Notice

Sub: - Registration of Producers, Importers & Brand-Owners (PIBOs) and Plastic Waste Processors (PWPs) on Centralized Extended Producer Responsibility (EPR) Portal for Plastic Packaging

Ministry of Environment, Forest & Climate Change (MoEFCC), Govt. of India, notified guidelines on Extended Producer Responsibility (EPR) for Plastic Packaging vide fourth amendment to Plastic Waste Management (PWM) Rules on February 16, 2022. Producers, Importers & Brand-Owners (PIBOs) and Plastic Waste Processors (PWPs) are required to register on centralized EPR Portal developed by Central Pollution Control Board (CPCB) to fulfil their EPR liability as per the notified EPR Guidelines.

The PIBOs are required to obtain registration from CPCB if operating in more than two States/UTs and from concerned State Pollution Control Board (SPCB) / Pollution Control Committee (PCC) if operating in one or two States/UTs only. Also, PWPs are required to obtain registration from the concerned SPCBs/PCCs.

The EPR Portal (https://eprplastic.cpcb.gov.in/#/plastic/home) was launched on April 05, 2022 and 36,230 PIBOs and 2351 PWPs have been registered on the Portal on date. However, it is observed that several PIBOs & PWPs are still operating their business without obtaining registration from CPCB/SPCB/PCC (as applicable) which is in violation of provisions of PWM Rules 2016 (as amended).

This notice is being issued to inform all the PIBOs & PWPs to obtain registration from CPCB/SPCB/PCC (as applicable) in accordance with provisions of PWM Rules, 2016. PIBOs & PWPs, who have not yet applied for registration are required to submit registration application complete in all respects on the EPR Portal by March 31, 2024. Guidance Manual and the Standard Operating Procedure (SOP) for registration of PIBOs/PWPs, uploaded on EPR Portal, may be referred to for the purpose.

Necessary action, as deemed appropriate under the Environment (Protection Act), 1986, including levying of Environmental Compensation and closure of operations, shall be taken against defaulters.

(Bharat Kumar Sharma)
Member Secretary

'परिवेश भवन' पूर्वी अर्जुन नगर, दिल्ली-110032
Parivesh Bhawan, East Arjun Nagar, New Delhi - 110032
दूरभाष/Tel: 43102030, 22305792, वेबसाईट/Website : www.cpbc.nic.in

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
MINISTRY OF ENVIRONMENT FOREST & CLIMATE CHANGE GOVT OF INDIA

F.No.CP-20/80/2021-UPC-II-HO-CPCB-HO-Part(2) Date: 20.11.2023

To,

The Chairman
All SPCBs/PCCs (as per list)

Sub: Directions under Section 5 of the EPA, 1986 regarding compliance of various provisions under Schedule – II of Plastic Waste Management Rules, 2016, *i.e.*, Guidelines on Extended Producer Responsibility (EPR); and

WHEREAS, the Ministry of Environment, Forest & Climate Change (MoEF&CC) has notified Plastic Waste Management Rules, 2016, in exercise of the powers conferred under sections 3, 6 & 25 of the Environment (Protection) Act, 1986 vide Notification No. G.S.R 320 (E) dated March 18, 2016; and

WHEREAS, Plastic Waste Management Rules, 2016 was amended and notified by Ministry of Environment, Forest & Climate Change (MoEF&CC) on 16 February, 2022 to insert Schedule – II, *i.e.,* Guidelines on Extended Producer Responsibility for Plastic Packaging (hereinafter referred as "EPR Guidelines"); and

WHEREAS, as per Section 6.1(a) of the EPR Guidelines, "*The following entities shall register on the centralized portal developed by Central Pollution Control Board namely: - (i) Producer (P); (ii) Importer (I); (iii) Brand owner (BO), (iv) Plastic Waste Processor engaged in (a) recycling, (b) waste to energy, (c) waste to oil, and (iv) industrial composting;"* and

WHEREAS, as per Section 11.1 of the EPR Guidelines, "*All plastic waste processors shall have to register with concerned State Pollution Control Board or Pollution Control Committee in accordance with provisions of 13(3) of Plastic Waste Management Rules, 2016 on the centralized portal developed by Central Pollution Control Board. Central Pollution Control Board shall lay down uniform procedure for registration within three months of the publication of these guidelines"* and

WHEREAS, CPCB developed the Standard Operating Procedure (SOP) for registration of PWPs on March 15, 2023 and uploaded the same on CPCB website in accordance with EPR guidelines; and

WHEREAS, as per Section 11.2 of EPR Guidelines, "*The Plastic waste processors shall submit annual returns after end of every financial year by 30th April of the next financial year on the quantity of plastic waste processed category-wise as per prescribed pro forma on the centralized portal developed by Central Pollution Control Board*"; *and.*

WHEREAS, as per Section 11.5 of the EPR Guidelines, "*Only plastic waste processors registered under Plastic Waste Management Rules, 2016, as amended, shall provide certificates for plastic waste processing, except in case of use of plastic waste in road construction. In case where plastic waste is used in road construction the Producers, Importers & Brand-Owners shall provide a self-declaration certificate in pro forma developed by Central Pollution Control Board. The certificate provided by only registered plastic waste processors shall be considered for fulfilment of Extended Producer Responsibility obligations by Producers, Importers & Brand-Owners*"; and

WHEREAS, as per Section 11.7 of the EPR Guidelines, "*The certificate for plastic packaging waste provided by registered plastic waste processors shall be in the name of registered Producers, Importers & Brand-Owners or Local authorities, as applicable, based upon agreed modalities. Central Pollution Control Board will develop mechanism for issuance of such certificate on the centralized portal* "; and

WHEREAS, as per the EPR Guidelines, CPCB has developed the Centralized portal for registration of Producers, Importers and Brand-owners (PIBOs) & Plastic Waste Processors (PWPs) that has been formally launched on April 05, 2022; and

WHEREAS, CPCB has developed the mechanism for Generation & Transfer of EPR Certificates (as given in the Guidance Manual developed by CPCB) by PWPs on the EPR Portal and the corresponding online module of the EPR Portal was launched on November 19, 2022; and

WHEREAS, Registration of PWPs by SPCBs/PCCs is on the basis of information provided online by PWPs on the EPR Portal which includes details of plant and machinery (processing capacity, production capacity, power rating, etc.), geotagged photograph of the plant & machinery, raw material, production and sales section of the Units, short video of the Unit etc.; and

WHEREAS, as per clause 4(iv) of SOP "*Physical Audit of the PWP to be completed by SPCB/PCC within 30 days of grant of Registration. The PWP shall be able to issue certificates to PIBOs post conduction of Audit and validation of its facilities by the SPCB/PCC*"; and

WHEREAS, in accordance with aforesaid clause of SOP, upon grant of registration to PWP, SPCB/PCC are required to physically verify details of plant and machinery (processing capacity, production capacity, power rating etc.), geotagged photograph of the plant & machinery, raw material, production and sales section of the Units, short video of the Unit etc. as per the checklist provided on EPR portal for the purpose; and

WHEREAS, CPCB has developed the Guidance manual for operating Centralized EPR Portal which includes details of procedure for Registration of PIBOs/PWPs, Generation & Transfer of EPR certificates etc., which was made available on EPR portal. Several training sessions/meetings were also conducted with SPCBs/PCCs/Industrial Associations/PWPs and other stakeholders in which inspection requirements/procedures for grant of approval of physical verification of PWPs to be followed by SPCBs/PCCs were covered. SPCBs/PCCs were required to upload approval status of Physical verification of PWPs on the EPR portal following these procedures; and

WHEREAS, CPCB vide directions dated 10.03.2023 and 04.07.2023 reiterated that all SPCBs/PCCs to complete physical verification of all registered PWPs in their jurisdiction within the stipulated time frame to enable the PWPs to generate EPR certificates within the timelines stipulated in EPR guidelines; and

WHEREAS, CPCB vide directions dated 21.12.2022 had directed all PWPs to upload GST E-invoice of all transactions (sales/ purchase) related to processing of plastic packaging & plastic waste on the EPR Portal; and

WHEREAS, viewing rights of the PWP dashboard have been provided to the officials of SPCBs/PCCs to monitor the PWP operations including procurement, production, sale and Certificate generation & transfer by PWP Units registered in their jurisdiction and the same was communicated during the training sessions for SPCBs/PCCs conducted by CPCB for the purpose; and

WHEREAS, Section 12.4 of the EPR Guidelines provides that "*Central Pollution Control Board by itself or through a designated agency shall verify compliance of Producers, Importers & Brand-Owners through inspection and periodic audit, as deemed appropriate. Central Pollution Control Board, as required, can also verify compliance of Plastic Waste Processors through inspection and periodic audit. In case of plastic waste processors and Producers, Importers & Brand-Owners operating in a State or Union Territory, Central Pollution Control Board may, if required, direct State Pollution Control Board or Pollution Control Committee to take action*"; and

WHEREAS, audit of random five Plastic Waste Processors (Recyclers) was conducted during Aug-Sept 2023 by CPCB in accordance with Clause 12.4 of the EPR

Guidelines. These units are registered on EPR Portal and Physical Verification of these units has been approved by concerned SPCBs/PCCs; and

WHEREAS, following one or more non-compliances / irregularities w.r.t implementation of EPR Guidelines were observed by the CPCB officials during the aforesaid audit in some of the aforesaid five units:

a. The plastic waste processing capacity of the units as registered by the SPCB/PCC is much higher than the actual installed/commissioned plant & machinery processing capacity in the unit. In few cases, plant & machinery are installed in the premises, but yet not commissioned.

b. Electricity and water connection has not been provided to the plant machinery; electrical and civil works were not in place and work on the same found to be still in progress during the Audit. The unit could not even perform trial run to assess the processing capacity.

c. The geotagged photographs /video of the plant uploaded with the application were not found to be in conformity with the actual observations on the field, indicating that fabricated photographs had been uploaded with the application. That the same has also not been checked during the Physical verification by the concerned SPCB/PCC.

d. The plant & machinery corresponding to the registered processing capacity granted by SPCB/PCC was neither found declared on the EPR portal nor found to be installed and commissioned in the unit by the Audit team.

e. As a result of (a) to (d) above, the unit has generated EPR Certificates of excess values for which which the actual production capacity does not exist with the unit.

f. As per the information on the EPR Portal, invoices were randomly verified and it has been observed that such verified invoices have been generated for Services provided towards collection and recycling and not for requisite actual sales of recycled plastic.

g. No relevant information was made available by the unit to the audit team to verify processing of plastic waste and sale of proportionate quantity of finished product corresponding to the value of EPR certificates generated, which included the following:

   i. Procurement of Plastic waste (Procurement invoices, Supplier details, etc.)
   ii. Electricity consumption (Electricity bill)
   iii. Procurement of additives required for processing plastic waste
   iv. Sale of recycled plastic (GST Statement, Sales invoices, etc.)

h. No worker was available in the unit or number of workers were found much less than that reported in the application form.

i. The Consent to Establish and Consent to Operate have been granted in quick succession within a gap of few days (less than a week). It is not clear as to how the unit of such scale (in this case- a large scale unit) , was established in such a short time.

j. Plot area as observed by the Audit team was not in conformity with the Plot area reported in the application form. Further, the area available for production, raw material & product storage was not found to be adequate.

k. No plastic waste was found in the premises in few cases.

l. ETP of the plant found to be under construction, in few cases, despite the fact that CTO has been granted to the unit by SPCB/PCC.

In view of the above, it is observed that EPR Certificates of the very high values have been generated by some of the units whereas such units neither have processing capacity for the said quantity nor relevant prescribed supporting documents/information. The units have obtained registration and generated the said EPR certificates of very high values without any actual processing of plastic at the units and by submitting false documents/information, which is in gross violation of provisions of EPR Guidelines as notified under Schedule II of the PWM Rules by MoEFCC, CPCB's Guidance manual for operating Centralized EPR Portal and other directions/communications issued by CPCB from time to time. The process of generation of EPR Certificates by the unit has not been monitored by the concerned SPCB/PCC despite being the enforcing agency notified under the PWM Rules and having viewing provision of the PWP dashboard of the EPR portal.

WHEREAS, as per Section 11.4 of the EPR Guidelines "*In case, at any stage it is found that the information provided by the plastic waste processor is false, the plastic waste processor shall be debarred by State Pollution Control Board, as per procedure laid down by Central Pollution Control Board, from operating under the Extended Producer Responsibility framework for a period of one year*"; and

WHEREAS, as per Section 11.6 of the EPR Guidelines "*The pro forma for the certificate shall be developed by Central Pollution Control Board. In no case, the amount of plastic packaging waste recycled by the enterprise shall be more than installed capacity of the enterprise. The certificates will be for plastic packaging category-wise and shall include GST data of the enterprise*"; and

WHEREAS, as per Section 13.1 of the EPR Guidelines "*The concerned State Pollution Control Board or Pollution Control Committee shall register Producers, Importers & Brand-Owners (operating in one or two states) and plastic waste processors, through*

the online portal developed by Central Pollution Control Board. Provision for registration shall be made on the Extended Producer Responsibility portal. State Pollution Control Board or Pollution Control Committee by itself or through a designated agency shall verify compliance of Producers, Importers & Brand-Owners through inspection and periodic audit, as deemed appropriate, of Producers, Importers & Brand-Owners as well as plastic waste processors in their jurisdiction as per the Plastic Waste Management Rule, 2016"; and

WHEREAS, as per Rule 18 of PWM Rules " *The Environmental Compensation shall be levied based upon polluter pays principle, on persons who are not complying with the provisions of these rules, as per guidelines notified by the Central Pollution Control Board*"; and

WHEREAS, as per the EC Regime framed by CPCB in 2022, Environmental Compensation is to be levied on PWP @ Rs. 5000/- per ton of plastic waste misreported for quantity of plastic procured and EPR certificate generated after following due legal procedure*";* and

NOW, THEREFORE, in view of above and in exercise of the powers vested to Chairman, Central Pollution Control Board (CPCB) vide Notification No. S.O.730 (E) dated July 10, 2002 notified as per provisions of Section 5 of the Environment (Protection) Act, 1986, following directions are issued for compliance:

1. To take immediate necessary actions to improve upon the system of grant of registration within SPCB/PCC, monitoring and enforcement ensuring enforcement of the PWM Rules, EPR guidelines and directions/guidelines issued by CPCB, including the following:

    a. To re-check processing facilities of Registered PWPs in your state and to confirm that the Processing capacity as per the Registration granted to them is in conformity with the actual facilities available in the unit. All other details provided in the online application form are also to be revalidated by SPCB/PCC.
    b. To regularly monitor EPR Certificate generation process of the Registered PWPs ensuring that EPR Certificates generated by PWPs are in accordance with requirements prescribed in CPCB guidance manual such as uploading of GST E-invoice corresponding to the sales of finished on the EPR Portal.
    c. If violations are observed as per (a) & (b) above, to conduct detailed enquiry into the issue of CTE and CTO and also as to how physical verification of the Unit was approved by SPCB/PCC, in view of the gross violations observed also as to why the process of generation of EPR Certificates was not monitored by SPCB/PCC.

d. To fix the liability on erring official/s and take disciplinary action against erring officials, if any, as per the findings of the enquiry set up, as at (c) above.

2. To take the following actions against the defaulting PWPs, if any , identified as per (1) above

   i. To suspend the consent/authorization/registration issued to the defaulting PWPs, with immediate effect and issue show cause notice to debar such PWPs from operating under the Extended Producer Responsibility framework for a period of one year as per Clause 11.4 of the EPR Guidelines or/ and for revocation of the consent/authorization/registration issued to the Unit;

   ii. To levy Environmental Compensation (EC), corresponding to the quantum of EPR certificates generated not in conformity with requirement prescribed in CPCB Guidance manual for operating Centralized EPR Portal. The EC is to be levied as per "Guidelines for Assessment of Environmental Compensation to be levied for violation of PWP Rules"(https://cpcb.nic.in/uploads/plasticwaste/EC_Regime_PWM.pdf) and Unit be directed to deposit the same in the designated Escrow Account, created by the SPCB/PCC for the purpose.

   iii. To take necessary action as per applicable law against violating PWPs which have submitted false documents for obtaining registration as well as for generating EPR certificates. It may further be ensured that action taken by SPCB/PCC regarding these units should act as a deterrent for other Units in committing such violations.

3. To take all necessary steps to ensure that PWPs henceforth complies with all conditions including generating GST E-invoice for all sales of only finished products and uploads the same on the EPR Portal, failing which necessary action be immediately taken including levying of EC against each non-complying Unit.

You are, hereby, directed to take necessary action immediately for ensuring compliance of the aforesaid directions and submit action taken report to this office within 10 days from the date of issuance of this direction.

(Tanmay Kumar)
Chairman

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
MINISTRY OF ENVIRONMENT FOREST & CLIMATE CHANGE GOVT OF INDIA

F-No. CP-20/37/2023-UPC-II-HO-CPCB-HO 4400-4431 **September 21, 2023**

To,

The Chairman
SPCB/PCC
(As per list)

Sub: Direction Under Section 5 of the Environment (Protection) Act, 1986 to SPCBs/PCCs for submission of incomplete/no information for Annual Report (2022-23) on Implementation of Plastic Waste Management Rules, 2016 (as amended)

WHEREAS, the Ministry of Environment, Forest and Climate Change (MoEF&CC) notified the Plastic Waste Management Rules, 2016 in exercise of the powers conferred under sections 3,6 and 25 of the Environment (Protection) Act, 1986 vide Notification No. G.S.R 320 (E) dated March 18, 2016; and

WHEREAS, Ministry of Environment, Forest and Climate Change amended PWM Rules 2016 vide Notification No. G.S.R. 285(E) dated March 27, 2018; and

WHEREAS, as per rule 17(2) of the PWM Rules, 2016, as amended, "*Every local body shall prepare and submit an annual report in Form –V to the concerned Secretary-in-charge of the Urban Development Department under intimation to the concerned State Pollution Control Board or Pollution Control Committee by the 30th June, every year*"; and

WHEREAS, as per rule 17(3) of the PWM Rules, 2016, as amended, *"Each State Pollution Control Board or Pollution Control Committee shall prepare and submit an annual report in Form VI to the CPCB on the implementation of these rules by the 31st July, of every year"*; and

WHEREAS, *as per rule 17(4) of PWM Rules, 2016 as amended, The CPCB shall prepare a consolidated annual report on the use and management of plastic waste and forward it to the Central Government along with its recommendations before the 31st August of every year"; and*

WHEREAS, honourable NGT in the matter of O.A No. 247/2017 had directed that "*all the States and Union Territories to ensure that reports in terms of Rule 13 are furnished to the CPCB positively within one month or 30th April, 2019, for the period the reports are due as per rules and not filed so far. CPCB may prepare Action plan for submission of compliance state of PWM Rules by states/UTs*". CPCB had prepared a comprehensive format for the action plan for submission of compliance status of PWM Rules by states/UTs and obtained detailed information from the States/UT during the period 2019-21; and

WHEREAS, CPCB, subsequently, had directed SPCBs/PCCs to file Action Plan (Form VI) in the prescribed format **(Annexure I)** in the Annual Report submitted to CPCB which included data related to plastic waste generated, collected and processed (recycled, co-processing, road making, waste to oil); and

WHEREAS, incomplete/no information regarding Annual Report and Action plan for year 2022-23 has been received from your office; and

NOW, THEREFORE, in view of above and in exercise of powers vested under Section 5 of Environment (Protection) Act, 1986 to the Chairman, CPCB, it is directed to submit complete information for Annual Report for Financial Year 2022-23 on Implementation of Plastic Waste Management Rules, 2016, as amended along with the Action Plan as per prescribed format.

You are requested to take necessary action to ensure compliance of above direction within 15 days of issue this direction.

25/9/23

(Tanmay Kumar)
Chairman

Copy to:

1. **Additional Secretary (CP Division)**
   Ministry of Environment, Forests & Climate Change
   Indira Paryavaran Bhawan, Jor Bagh Road,New Delhi,110003
   : For kind information please

2. **Incharge, IT Division**
   CPCB
   : For uploading on CPCB website

(Bharat Kumar Sharma)
Member Secretary

By Registered Post

F. No. B-31011/BMW (14499)/2023/WMD-I 4685

27th September, 2023

To,

M/s Belgaum Green Environment Management Pvt. Ltd.,
Sy No 29/2, Harugoppa Village,
Saundatti Taluk, Belagavi District,
Belagavi, Karnataka

DIRECTION UNDER SECTION 5 OF THE ENVIRONMENT (PROTECTION) ACT, 1986 AND SHOW CAUSE NOTICE - THEREOF FOR IMPOSITION OF ENVIRONMENTAL COMPENSATION

WHEREAS the Central Government has notified the Bio-Medical Waste Management Rules, 2016 and amendments thereof (herein after referred as BMWM Rules, 2016) in suppression of the Bio-Medical Waste (Management & Handling) Rules, 1998, and amendments thereof, under the Environment (Protection) Act, 1986, to improve the collection, segregation, processing, treatment and disposal of the Bio-Medical wastes in an environmentally sound management thereby, reducing the biomedical waste generation and its impact on the environment; and

WHEREAS Rule 5 of BMWM Rules, 2016 stipulate duties of the operator of Common Bio-Medical Waste Treatment Facility (CBWTF) to ensure treatment and disposal of biomedical waste in line with provisions of said Rules; and

WHEREAS as per Rule 7 (1) of BMWM Rules, 2016, the bio-medical waste is required to be treated and disposed off in accordance with Schedule I and in compliance with the standards prescribed in Schedule II of the BMWM Rules, 2016; and

WHEREAS Rule 14 (1) of BMWM Rules, 2016 stipulate that every authorized person is required to maintain records related to generation, collection, segregation, storage, transportation, treatment, disposal and or any form of handling of Bio-Medical waste in accordance with these Rules and guidelines issued by CPCB"; and

WHEREAS the Hon'ble National Green Tribunal, in the matter of O.A. No. 710 of 2017 filed by Shailesh Singh vide order dated 12.03.2019 directed "CPCB to undertake study and prepare a scale of compensation to be recovered from violators of Bio-Medical Waste Management Rules, 2016. Hon'ble NGT also directed that scale of compensation must be deterrent, rendering violation of Rules to be non-profitable which should be adequate to remedy the situation"; and

WHEREAS Hon'ble National Green Tribunal in its order dated 15.07.2019 in the matter of O.A. No. 710 of 2017, accepted Guidelines for "Imposition of Environmental Compensation Charges (ECC) against Healthcare Facilities (HCFs) and Common Biomedical Waste Treatment Facilities (CBWTFs)"; and

WHEREAS the CBWTF namely M/s Belgaum Green Environment Management Pvt. Ltd., Sy. No. 29/2, Harugoppa Village, Saundatti Taluk, Belagavi District, Belagavi, Karnataka (the Unit) was inspected by Central Pollution Control Board (CPCB) on 19.07.2023 wherein following non-compliances were observed:

2. The Member Secretary
Karnataka State Pollution Control Board,
Parisara Bhavana,1st to 5thFloor
49, Church Street,
Bengaluru – 560 001. : For kind information

3. The Regional Director,
The Regional Directorate
Central Pollution Control Board
1st & 2nd Floors, Nisarga Bhavan
A-Block, Thimmaiah Main Road
7th D Cross, Shivanagar, Opp. Pushpanjali Theatre,
Bangalore –560 010. : For kind information

4. I/c IT Division : For information and necessary action

5. I/c Accounts Division : For information & for further necessary action

(Bharat Sharma)

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE GOVT. OF INDIA

F. No. CP-20/117/2021-UPC-II-HO-CPCB-HO-Part(10) Date: 17-02-2023

To,

Airline Operators
(As per list)

Sub: - Direction under Section 5 of the Environment (Protection) Act, 1986 to Airlines operators for phasing out of Single Use Plastic (SUP) & obtaining Registration as per EPR Guidelines -Reg.

Whereas, the Ministry of Environment, Forest & Climate Change (MoEF&CC) notified the Plastic Waste Management (PWM) Rules, 2016, in exercise of the powers conferred under section 3, 6 & 25 of the Environmental (Protection) Act, 1986 vide Notification No. G.S.R. 320 (E) dated March 27, 2016; and

Whereas, MoEF&CC issued Notification, dated August 12, 2021 which mandated banning of identified Single Use Plastic (SUP) items with effect from July 01, 2022; and

Whereas, as per Rule 4(2) of PWM Rules, 2016 (as amended), *"The manufacture, import, stocking, distribution, sale and use of following single use plastic (SUP), including polystyrene and expanded polystyrene, commodities shall be prohibited with effect from the 1st July, 2022:*

(a) ear buds with plastic sticks, plastic sticks for balloons, plastic flags, candy sticks, ice-cream sticks, polystyrene [Thermocol] for decoration.

(b) Plates, cups, glasses, cutlery such as forks, spoons, knives, straw, trays, wrapping or packing films around sweet boxes, invitation cards, and cigarette packets, plastic or PVC banners less than 100 micron, stirrers; and

Whereas, as per Rules 4(1)(c) of PWM Rules, 2016 (as amended) *"Carry bag made of virgin or recycled plastic shall not be less than seventy five microns in thickness with effect from the 30th September,2021 and one hundred and twenty (120) microns in thickness with effect from 31st December, 2022"*; and

Whereas, as per Rules 4(d) of PWM Rules, 2016 (as amended*), "plastic sheet or like, which is not an integral part of multilayered packaging and cover made of plastic sheet used for packaging, wrapping the commodity shall not be less than fifty microns in thickness except* ***as specified by Central Government*** *where the thickness of such plastic sheets impair the functionality of the product"*;

Whereas, as per Rules 4(1)(j) of PWM Rules, 2016 (as amended) *"Non-woven plastic carry bag shall not be less than 60 Gram Per Square Meter (GSM) with effect from the 30th September, 2021";*

Whereas, MoEF&CC notified Extended Producer Responsibility (EPR) Guidelines for Plastic Packaging in Schedule II of Fourth Amendment to PWM Rules on February 16, 2022; and

Whereas, as per Section 4 of the notified EPR Guidelines, brandowners , producers and importers (PIBOs) of plastic packaging are covered under the Extended Producer Responsibility obligations and provisions of the EPR guidelines; and

Whereas, as per Section 10.1 of the EPR guidelines, brandowners, producers and importers of plastic packaging have to register on the Centralized EPR Portal developed by CPCB; and

Whereas, CPCB has developed online portal https://eprplastic.cpcb.gov.in for registration of PIBOs which was launched by Hon'ble MEF on April 05, 2022; and

Whereas, it has been observed that banned SUP items (as per MoEF&CC notification dated August 12, 2021), thin plastic sheets (less than 50 microns thickness), thin plastic bags (less than 120 microns thickness) are continued to be used by various operators in the Airlines sector which is in violation of PWM Rules 2016 (as amended); and

Whereas, it has been observed that plastic packaging (more than 50 micron), without obtaining Registration as per notified EPR Guidelines, is used by various operators in the Airlines sector which is in violation of PWM Rules 2016 (as amended);

Now, **therefore,** in compliance of above and in exercise of powers vested under Section 5 of Environment (Protection) Act, 1986 to the Chairman, CPCB, following Directions are being issued for compliance:

i. To ensure that banned SUP items (as per MoEF&CC notification dated August 12, 2021), thin plastic sheets (less than 50 microns thickness), thin plastic bags (less than 120 microns thickness) are not sold/ stocked/ used in any form by your Airline.

ii. To obtain Registration as a Brand-owner/Producer/Importer (as applicable) under PWM Rules, 2016 (as amended) on Centralized EPR portal, if using plastic packaging more than 50 micron thickness in any form.

Necessary action for compliance of aforesaid directions shall be taken and Action Taken Report to be submitted to this office within 15 days of issue of these directions, failing which appropriate action including levying of Environmental Compensation will be taken under the provision of Environmental (Protection) Act, 1986.

Yours faithfully,

17/2

(Tanmay Kumar)
Chairman

Copy to:

1. Sh. Naresh Pal Gangwar, Additional Secretary, Ministry of Environment, Forests & Climate Change Indira ParyavaranBhawan Jorbagh Road, New Delhi – 110003 : for kind information please

2. DH (IT) : for uploading on CPCB website

(Prashant Gargava)
Member Secretary

O/C

LIST OF AIRLINES

S.No.	Name	Address
1.	Air India	M/s. Air India Limited Airlines House, 113 Gurudwara Rakabganj Road, New Delhi, Delhi, 110001
2.	Air India Express	M/s. Air India Express Ltd. Door No. 54/4042 A&B, 5th Floor, Aryabhangy Pinnacle, Sahodaran Ayyappan Road, Elamkulam, Kochi, Kerala 682020
3.	AIX Connect	M/s. AIX Connect Private Limited Ground Floor, Alpha 3 Building Kempegowda International Airport, Devenahalli, Bangalore, Bangalore, Karnataka
4.	Akasa Air	M/s. Akasa Air Urmi Estate, Tower A, 12th Floor 95, Ganpatrao Kadam Marg, Lower Parel (W), Mumbai 400013
5.	Go First	M/s. Go Airlines (India) Ltd Terminal 2, Indira Gandhi International Airport New Delhi -110037
6.	IndiGo	M/s. IndiGo Level 1, Tower C, Global Business Park, Mehrauli-Gurgaon Road, Gurgaon – 122 002, Haryana
7.	SpiceJet	M/s. SpiceJet Ltd. 319, Udyog Vihar, Phase IV, Gurgaon – 122016 Haryana
8.	Vistara	M/s. Tata SIA Airlines Limited Intellion Edge, Tower A, 9th and 10th Floor, South Peripheral Road, Sector – 72, Gurugram, Haryana - 122101
9.	Alliance Air	M/s. Alliance Air Aviation Limited Alliance Bhawan, Domestic Terminal-1, I.G.I. Airport, New Delhi 110037
10.	FlyBig	M/s. FlyBig Killa No. 13, 3rd Floor, Begumpur, Khatola, Gurugram - 122001, Haryana
11.	Star Air	M/s. StarAir 2nd Floor, Block 3 Sindhu Logistic Park, No. 34, Nellakunte, Bettahalasuru, Hunsemaranahalli (P), Bangalore - 562 157,

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE GOVT. OF INDIA

F. No. CP-20/117/2021-UPC-II-HO-CPCB-HO-Part(10) Dated: 25 -01-2023

To,

M/s. E-commerce Company
(As per list)

Sub: - Closure Directions under Section 5 of the Environment (Protection) Act, 1986 for Non-compliance of PWM Rules, 2016 (as amended) - Reg.

Whereas, the Ministry of Environment, Forest & Climate Change (MoEF&CC) notified the Plastic Waste Management (PWM) Rules, 2016, in exercise of the powers conferred under section 3, 6 & 25 of the Environmental (Protection) Act, 1986 vide Notification No. G.S.R. 320 (E) dated March 27, 2016; and

Whereas, MoEF&CC issued Notification, dated August 12, 2021 which mandated banning of identified Single Use Plastic (SUP) items and prescribed minimum thickness of carry bag with effect from July 01, 2022; and

Whereas, as per Rule 4(2) of PWM Rules, 2016 (as amended), *"The manufacture, import, stocking, distribution, sale and use of following single use plastic (SUP), including polystyrene and expanded polystyrene, commodities shall be prohibited with effect from the 1st July, 2022:*

(a) ear buds with plastic sticks, plastic sticks for balloons, plastic flags, candy sticks, ice-cream sticks, polystyrene [Thermocol] for decoration.

(b) Plates, cups, glasses, cutlery such as forks, spoons, knives, straw, trays, wrapping or packing films around sweet boxes, invitation cards, and cigarette packets, plastic or PVC banners less than 100 micron, stirrers; and

Whereas, as per Rules 4(1)(c) of PWM Rules, 2016 (as amended) *"Carry bag made of virgin or recycled plastic shall not be less than seventy five microns in thickness with effect from the 30th September, 2021 and one hundred and twenty (120) microns in thickness with effect from 31st December, 2022"*; and

Wheras, as per Rule 4(1)(d) of PWM Rules (as amended) *"Plastic sheet or like, which is not an integral part of multilayered packaging and cover made of plastic sheet used for packaging, wrapping the commodity shall not be less than fifty microns in thickness except as specified by the Central Government where the thickness of such plastic sheets impair the functionality of the product"*; and

Whereas, as per Rule 4(1)(j) "*non-woven plastic carry bag shall not be less than 60 Gram Per Square Meter (GSM) with effect from the 30th September, 2021.*"; and

Whereas, M/s. Unit Name Limited is engaged in selling / using banned SUP items as per the said Notification; and

Whereas, vide letter No. B.17011/7/UPC-II-PWM(SUP)/2022 dated 01/02/2022, CPCB issued following Directions to your unit to stop selling / usage of banned SUP items through the online platform provided by your organization with effect from July 01, 2022.

Whereas, vide letter dated 03-6-2022, a reminder letter was sent for compliance of the above said direction issued to your unit; and

Whereas, report on compliance of aforementioned Directions has not been received from your organization, although six months have lapsed since the ban on SUP items has been in force, as per MoEF&CC Notification dated 12.08.22.; and

Whereas, CPCB issued Show Cause Notice dated December 13, 2022 under Sec 5 of the Environment (Protection) Act, 1986 (notice thereof) to your unit for i) Closure of operations of the unit ii) Levying of Environment Compensation for non-compliance of provisions of PWM Rules, 2018 and given an opportunity to submit its reply within 10 days from issuance of these directions; and

Whereas, M/s. Unit name has not submitted any response to CPCB so far;

Whereas, as per the EC Regime prepared by CPCB, Environmental Compensation is to be levied @Rs.5000/- per ton of SUP items sold in marketplace through your platform.

NOW THEREFORE, in view of above and in exercise of the powers vested to Chairman, Central Pollution Control Board (CPCB) under Section 5 of the Environment (Protection) Act, 1986, the following directions are issued to your unit:

1. The industry shall close down its operations with immediate effect and not resume its operations till it complies with provision of the PWM Rules, 2016 (as amended) related to SUP ban.

2. The unit shall pay **Rs. 25,00,000/-** (Twenty Five lakhs only) as interim Environmental Compensation charge for violation of Plastic Waste Management Rules, 2016 (as amended) to CPCB (A/c No. 532702050000164, Bank Name: Union Bank Of India, IP Extension Branch, Vikash marg Ext, Delhi, IFSC: UBIN0553271). In case of delay, simple interest @12% shall be levied for the delay period (delay period shall be calculated after 15 days of issue of this direction till the date of EC deposited by the unit).

You are required to take necessary action to comply with the above Directions and submit the Compliance report within 15 days of issue of these Directions, failing which CPCB shall be constrained to take action as deemed fit under Section 5 of EPA.

Yours faithfully,

25/1/23

(Tanmay Kumar)
Chairman

Copy to:

1. The Secretary,
   Ministry of Electronics and Information Technology
   (Government of India)
   Electronics Niketan, 6, CGO Complex,
   Lodhi Road, New Delhi – 110003
   : For information & necessary action please

2. Sh. Naresh Pal Gangwar,
   Additional Secretary,
   Ministry of Environment, Forests & Climate Change
   Indira Paryavaran Bhawan, Jorbagh Road,
   New Delhi – 110003

3. DH (IT)

(Prashant Gargava)
Member Secretary

O/C

E commerce companies (Non-complying)

Sl. No.	Name	Address
1.	MS Movers and Packers	M/s. MS Movers and Packers 8A/ 174/2740 Sai Co-operative Housing Society, Hariyali Village, Tagore Nagar, Vikroli East Mumbai, Maharashtra 400083
2.	Limeroad	M/s. A. M. Marketplaces Pvt Ltd (Lime Road) 4th & 5th Floor, Plot No. 48, Sector 44, Near HUDA City Center Metro Station, Gurgaon, Haryana – 122001
3.	Yepme	M/s. Yepme Limited 312 F, 3rd Floor, Centrum Plaza, Golf Course Road, Sector 53, Gurgaon 122001
4.	Netmeds	M/s. Netmeds 5th Floor, EA Chambers (Express Avenue) No 49 & 50 L, Whites Road, Royapettah, Chennai – 600014
5.	Zivame	M/s. Reliance Retail Limited (Zivame) 3rd Floor, Court House, Lokmanya Tilak Marg, Dhobi Talao, Mumbai, Maharashtra - 400 002
6.	Clovia	M/s. Purple Panda Fashions Private Limited (Clovia) 109 B -plot No. 18, Rajendra Jaina Tower, Wazirpur Commercial Complex, Wpia, New Delhi -110052
7.	Quikr	M/s. Quikr India Pvt. Ltd. 1st Floor, Raghuvanshi Mansion, Senapati Bapat Marg, Lower Parel, Mumbai, Maharashtra – 400013
8.	Sulekha	M/s. Sulekha.com New Media Pvt. Ltd. RMZ Millenia Business Park, 2nd Floor of, Campus 1A, No 143, Dr. MGR Road, Kandanchavadi, Perungudi, Chennai - 600 096
9.	Hopscotch	M/s. Hopscotch 1st Floor DGP House, Behind Bengal Chemical, Old Prabhadevi Road, Mumbai, Maharashtra 400025
10.	FreshMenu	M/s. FreshMenu No 1229, 4th Main Cross, Sector 7, HSR Layout, Bengaluru, Karnataka 560034

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE GOVT. OF INDIA

F. No. B.17011/7/UPC-II-PWM(SUP)/2022 Dated: 13-12-2022

To,

The Manufacturers,
(As per list)

Sub: Comprehensive Directions under Section 5 of the Environment (Protection) Act, 1986 to Plastic Raw Material Manufacturers for effective implementation of ban on identified Single-use plastic (SUP) items and implementation of Guidelines for Extended Producer Responsibility (EPR) on plastic packaging-Reg.

Whereas, the Ministry of Environment, Forest & Climate Change (MoEF&CC) notified the Plastic Waste Management (PWM) Rules, 2016, in exercise of the powers conferred under sections 3,6, & 25 of the Environmental (Protection) Act, 1986 vide Notification No. G.S.R. 320 (E) dated March 27, 2016; and

Whereas, MoEF&CC issued Notification, dated August 12, 2021 which mandated banning of following Single Use Plastic (SUP) items with effect from July 01, 2022; and

a. ear buds with plastic sticks, plastic sticks for balloons, plastic flags, candy sticks, ice-cream sticks, polystyrene [Thermocol] for decoration;

b. plates, cups, glasses, cutlery such as forks, spoons, knives, straw, trays, wrapping or packing films around sweet boxes, invitation cards, and cigarette packets, plastic or PVC banners less than 100 micron, stirrers.

Whereas, as per provision 4(1)(c) of PWM Rules 2018, (as amended), "*carry bags made of virgin or recycled plastic shall not be less than seventy five microns in thickness with effect from the 30th September, 2021and one hundred and twenty (120) microns in thickness with effect from the 31st December, 2022*"

Whereas, as per provision 4(d) of PWM Rules 2018, (as amended), *Plastic sheet or like, which is not an integral part of multilayered packaging and cover made of plastic sheet used for packaging, wrapping the commodity shall not be <50 microns in thickness except* ***as specified by Central Government*** *where the thickness of such plastic sheets impair the functionality of the product*";

Whereas, as per Rules 4(1)(j) of PWM Rules, 2016 (as amended) *"Non-woven plastic carry bag shall not be less than 60 Gram Per Square Meter (GSM) with effect from the 30th September, 2021"; and*

Whereas, As per provision 4(1-e) of the PWM Rules, as amended, "*The manufacturer shall not sell or provide or arrange plastic to be used as raw material to a producer, not having valid registration from the concerned State Pollution*

Control Boards or Pollution Control Committee or the Central Pollution Control Board; and

Whereas, MoEF&CC notified Guidelines for Extended Producer Responsibility for Plastic Packaging in Schedule II of Fourth Amendment to PWM Rules on February 16, 2022; and

Whereas, as per Section 10.1 of the EPR guidelines: "*The Producers, Importers & Brand-Owners (PIBOs) shall have to register through the online centralized portal developed by CPCB. The certificate of registration shall be issued using the portal*"; and.

Whereas, CPCB has developed online portal https://eprplastic.cpcb.gov.in/plastic/ for registration of PIBOs & PWPs which was launched on April 05, 2022; and

Whereas, M/s. Name of Industry is engaged in manufacturing plastic raw material which can be used for production of plastic items including plastic packaging as enumerated above; and

Whereas, vide letters dated 10-06-2022, CPCB issued following modified Directions to your unit for phasing out Single Use plastic; and

1. The manufacturers shall not directly supply plastic raw materials to producers (in formal/informal sector) engaged in production of banned SUP items.

2. Manufacturers shall inform its plastic raw material buyers that they shall not be supplying plastic raw material for production of banned SUP items w.e.f. July 01, 2022:

3. The manufacturers shall print the following advisory on their invoices raised for sale of plastic raw material w.e.f. July 01, 2022:
   "Not to be used in the manufacture of SUP items prohibited under PWM Rules"

4. The manufacturers shall print the following on all Packaging Bags of plastic raw material w.e.f July 01, 2022:
   "*Not to be used in the manufacture of SUP items prohibited under PWM Rules, 2016.*"

5. The following shall be incorporated in all MoU/ Sale Contracts/Price Lists pertaining to sales of plastic raw materials w.e.f July 01, 2022:
   "*Buyer hereby undertakes and warrants to comply, at all times, with the applicable laws including but not limited to the Plastic Waste Management Rules 2016 as amended from time to time and notifications and directives issued thereunder ("PWM Rules"), in relation to the use of the Goods. Buyer expressly undertakes and warrants that the plastic raw material purchased shall not be used, directly or indirectly, in production of banned Single Use Plastic (SUP) items, listed in PWM Rules.*"

6. The plastic raw material manufacturers shall provide sales details of plastic raw materials on quarterly basis to CPCB w.e.f. July 01, 2022 in the prescribed format.

Whereas, vide letters dated 17-08-2022 & 18-09-2022, CPCB issued following Directions to your unit:

1. Not to supply plastic raw materials directly to producers engaged in manufacture of plastic packaging not having valid registration certificate from the concerned State Pollution Control Boards or Pollution Control Committee or CPCB through the centralized EPR Portal.

2. Manufacturers shall send a communication to its plastic raw material customers that they, henceforth, shall not be supplying plastic raw material for production of banned SUP items to producers of plastic packaging not registered on CPCB portal.

3. The plastic raw material manufacturers shall submit quarterly sales details of plastic raw materials to CPCB.

4. To ensure that Registration No., as issued on the centralized EPR Portal to the plastic packaging producer, is henceforth incorporated in all invoices issued for sale of plastic raw material to such producers.

Whereas, production, sale and usage of banned SUP items and improper management of plastic packaging waste still continues in various sections of the Indian economy;and

Now, therefore, in exercise of powers vested under Section 5 of Environment (Protection) Act, 1986 to the Chairman CPCB, following comprehensive directions are issued to your industry:

1. Not to supply plastic raw materials directly to producers engaged in manufacture of plastic packaging not having valid registration certificate from the concerned State Pollution Control Boards or Pollution Control Committee or CPCB through the centralized EPR Portal.

2. Not to supply plastic raw materials directly to banned SUP producers. The list of banned items to include items listed in MoEF&CC Notification dated August 12, 2021, plastic sheets less than 50 micron thickness, plastic carry bags less than 75 micron thickness w.e.f 30.9.21 and & 120 micron w.e.f 31.12.22 and non-woven bags less than 60 GSM

3. To ensure that Registration No., as issued on the centralized EPR Portal to the plastic packaging producer, is henceforth incorporated in all invoices issued for sale of plastic raw material to such producers

4. To ensure that first buyer and every subsequent buyer of plastic raw materials shall maintain record of transactions of plastic raw material in electronic from, till such time the raw material is sold for making products.

5. To print the following advisory on their invoices raised for sale of plastic raw material w.e.f. July 01, 2022 *"Not to be used in the manufacture of SUP items prohibited under PWM Rules including plastic sheets < 50 micron thickness, non-woven carry bags < 60 GSM, Carry bags < 75 micron thickness w.e.f 30.9.21 and 120 micron thickness w.e.f 31.12.22"*

6. To print the following on all Packaging Bags of plastic raw material w.e.f July 01, 2022:*"Not to be used in the manufacture of SUP items prohibited under PWM Rules, 2016. including plastic sheets < 50 micron thickness, non-woven carry bags < 60 GSM, Carry bags < 75 micron thickness w.e.f 30.9.21 and 120 micron thickness w.e.f 31.12.22*

7. To incorporate the following in all MoU/ Sale Contracts/Price Lists pertaining to sales of plastic raw materials w.e.f July 01, 2022:
"Buyer hereby undertakes and warrants to comply, at all times, with the applicable laws including but not limited to the Plastic Waste Management Rules 2016 as amended from time to time and notifications and directives issued thereunder ("PWM Rules"), in relation to the use of the Goods. Buyer expressly undertakes and warrants that the plastic raw material purchased shall not be used, directly or indirectly, in production of banned Single Use Plastic (SUP) items, listed in PWM Rules."

8. To provide sales details of plastic raw materials on quarterly basis to CPCB w.e.f. July 01, 2022 in the prescribed format (annexed).

Necessary action shall be taken to ensure compliance of aforesaid directions and Action Taken Report submitted to this office on quarterly basis, failing which appropriate action including levying of Environmental Compensation will be taken against your industry in accordance with the provisions under Environmental (Protection) Act, 1986.

Yours faithfully,

(Tanmay Kumar)
Chairman

Copy to:

1. Sh. Naresh Pal Gangwar,
   Additional Secretary,
   Ministry of Environment, Forests & Climate Change
   Indira ParyavaranBhawan
   Jorbagh Road,
   New Delhi – 110003

2. DH (IT)

(Prashant Gargava)

O/C

Monthly report of Plastic Raw Material Manufacturers								
Duration			Month		Year			
Sl. No.	Name & Contact details (Address, E-mail ID & Phone No.)	Category (Supplier/Producer/Stockist/ Retail)	GST No. of the entity supplied to	Product manufactured (in case of producer)	Type of plastic raw material supplied	Qty of raw material supplied	Date of supply	GST paid

LIST OF LEADING MANUFACTURERS OF PLASTIC RAW MATERIAL

S.No.	Company	Registered Address
1	Reliance Industries Limited	Reliance Industries Limited 3rd Floor, Maker Chambers IV,,222, Nariman Point, Mumbai Maharashtra - 400021
2	Indian Oil Corporation Limited	Indian Oil Corporation Limited Indian Oil Bhavan G-9, Ali Yavar Jung Marg, Bandra (East), Mumbai -400051
3	Haldia Petrochemicals Ltd.	Haldia Petrochemicals Ltd. Tower 1, Bengal Eco Intelligent Park (Techna) Block EM, Plot No 3, Sector V, Salt Lake PO: Bidhan Nagar, District: North 24 Paraganas Kolkata 700091
4	GAIL (INDIA) Limited	GAIL (INDIA) Limited GAIL Bhawan, 16 BhikajiCama Place, R K Puram, New Delhi - 110066
5	HPCL–Mittal Energy Limited	HPCL–Mittal Energy Limited Phullokari Village, TalwandiSaboo Taluka, District Bathinda - 151301, Punjab
6	IVL Dhunseri Petrochem Industries Limited	IVL Dhunseri Petrochem Industries Limited 'Dhunseri House', 4A, Woodburn Park, Kolkata 700020
7	Supreme Petrochem Ltd.	Supreme Petrochem Ltd. Solitaire Corporate Park, Building No. 11, 5th Floor, 167, Guru Hargovindji Marg, Chakala, Andheri (East), Mumbai - 400093,
8	Finolex Industries Limited	Finolex Industries Limited Gat No. 399, Village Urse,,Taluka Maval, Pune District Maharashtra-410506
9	Chemplast Sanmar Limited	Chemplast Sanmar Limited 9 Cathedral Rd Madras Tamil Nadu 600086

10	LG Polymers India Pvt., Ltd.	LG Polymers India Pvt., Ltd. Quality Innovation & Solutions RR Venkatapuram, Visakhapatnam-530029. Andhra Pradesh, India.
11	INEOS Styrolution India Limited	INEOS Styrolution India Limited 5th Floor, OHM House-2, OHM Business Park, Near Balaji Hospital Subhanpura, Vadodara - 390007, Gujarat India
12	ONGC Petro additions Limited	ONGC Petro additions Limited 35, Nutan Bharat Co-operative Housing Society Limited, R.C. Dutt Road, Alkapuri, Vadodara-390007, Gujarat,
13	Mangalore Refinery and Petrochemicals Limited	Mangalore Refinery and Petrochemicals Limited Kuthethoor P.O., Via Katipalla, Mangalore, 575 030
14	Brahmaputra Cracker & Polymer Ltd.	Brahmaputra Cracker and Polymer Limited 1st Floor, House No 6 Bhuban Road, Uzanbazar Guwahati, Assam Pin - 781001
15	DCW Limited	DCW Limited Nirmal 3rd Floor, Nariman Point Mumbai-400021, India.
16	DCM Shriram Ltd.	DCM Shriram Ltd. 2nd Floor (West Wing) World Mark 1, Aerocity Delhi - 110037
17	Gujarat State Fertilizers & Chemicals Limited	Gujarat State Fertilizers & Chemicals Limited P. O. Fertilizernagar-391750, Dist. Vadodara, Gujarat
18	Bhansali Engineering Polymers Ltd.	Bhansali Engineering Polymers Ltd Unit No. 401,4th Floor, Peninsula Heights, C.D. Barfiwala Road, Andheri (West), Mumbai 400058

तन्मय कुमार, भा.प्र.से.
अध्यक्ष
Tanmay Kumar, I. A. S.
Chairman

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार
CENTRAL POLLUTION CONTROL BOARD
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, GOVT. OF INDIA

D.O.No.B.17011/1/UPC-II-PWM (SUP)/2022
12th October, 2022

Your kind attention is invited to CPCB's letter dated February 25, 2022 on the subject vide which you were requested to issue necessary instructions to concerned Authorities for execution of activities related to enforcement of ban on SUP items.

Despite the SUP ban on July 01, 2022, it is observed that use of SUP items, specifically the thin carry bags continues unabated in the low end section of the economy specifically street vendors, sabji mandis, flower sellers etc.

For strict enforcement of SUP ban, intensive activities are planned during October-December 2022 with focus on street vendors, sabzi mandis flower sellers, local market, checks at borders, inspection of concerned industries etc. Representative of State UDD Board as well as SPCB are required to be deployed in the inspection team for enforcement of SUP ban. Further, considering the sensitivity of the inspection involved, all administrative support including police protection is to be provided to the inspection team to avoid untoward incidents. Brief note prepared by CPCB (enclosed) may please be referred to for further detail.

In view of the above, you are requested to direct the concerned authorities (State UDD/State Env Deptt, SPCB/PCC, State Police Deptt.) to deploy concerned officials and provide all necessary assistance for execution of the planned activities for enforcement of SUP ban as mentioned in the annexed Schedule.

Yours sincerely
12/10
(Tanmay Kumar)

The Chief Secretary, All States/UTs

Copy to:

1. Principal Secretary, UDDs (All States/UTs) : for information & necessary action please
2. Principal Secretary, Environment (All States/UTs) : for information & necessary action please
3. Director General of Police : for information & necessary action please
4. Chairman, (All SPCBs/PCCs) : for information & necessary action please
5. Regional Directors (All RDs CPCB) : for information & necessary action please

12.10
(Tanmay Kumar)

Annexure I

Note on enforcement of Single Use Plastic (October- December 2022)

1.0 Background

Hon'ble MEF made the following observations during the meeting held on October 04, 2022:

- Use of alternatives SUP items observed in high-end sections of the economy.
- Use of SUP items continues unabated in the low end section of the economy specifically street vendors, sabji mandis, flower sellers etc.
- Interstate transportation of SUP items needs to be checked.

In view of above, the following plan of activities is proposed for enforcement of SUP ban during October- Decemeber 2022. Subsequent activities to be planned based on the outcome of the activities carried out in the next three months.

2.0 Proposed Plan of Action

2.1 Focus Areas

The SUP enforcement activities to focus on the following areas

- Street vendors including flower sellers.
- Sabji Mandi, Fish Markets etc
- Local markets
- Industries engaged in manufacturing of thin carry bags
- Checking at border areas to restrict interstate transportation of SUP items

2.2 Constitution of Teams & Coverage

CPCB shall conduct the inspections through 72 teams (27 teams at Head office and 45 teams at 9 CPCB Regional Directorates). Issuing of challans as well as seizure of SUP items has to be done onsite. The inspecting teams shall be directed to identify the suppliers/ manufacturers of SUP items through backtracking. As per Rule 12 (1) of the PWM Rules, State Boards have the authority for enforcement of the Rules related to manufacture of SUP items plastic products As per Rule 12 (2) Secretary, State UDD has the authority for enforcement of the provisions of these rules relating to use of SUP items. In view of above, representative of State UDD/State PCB shall be deployed in the inspection team. Further, considering the sensitivity of the inspection involved, police protection shall be provided to the inspection team to avoid untoward incidents as have been reported in the past. CPCB cover major million plus/ capital cities in the inspection.

2.3 Inspection Schedule

Inspection is proposed to be carried for 4 days a month covering the following specific areas

- Day 1: Street Vendors, Flower sellers, Local markets (October 17, 2022)
- Day 2: Wholesale Markets (for Delhi – Ghazipur, Azadpur, Okhla) /– Other RDs /SPCBs to identify these markets in their respective jurisdiction (October 18, 2022)
- Day3: Industrial Areas (for Delhi – Narela, Bawana, Seelampur area (October 19 2022- Other CPCB RDs/State Boards to identify industrial Areas in their jurisdiction)
- Day 4: Checking at interstate borders (For Delhi all checking shall be carried at interstate borders. Other CPCB RDs/State Boards to identify checkpoints accordingly) (October 20, 2022)

Necessary directions being issued to SPCB/PCCs to cover all cities/towns in their jurisdiction through their Regional offices. Letter is being issued to Chief Secretaries of all States to issue necessary instructions to concerned Authorities for deployment of State UDD officers for inspection and provision of police protection to inspection team.

SPEED-POST / E-MAIL

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE GOVT. OF INDIA

F. No.B-17011/7/UPC-II-PWM (MLP)/2021

Dated: 01.12.2021

To,

The Chairperson,
Central Board of Indirect Taxes and Customs
North Block, Secretariat Building,
New Delhi - 110001

Sub: Registration of Importers as per provision of Plastic Waste Management Rules, 2016 as amended

Sir,

Ministry of Environment, Forest and Climate Change has notified Plastic Waste Management (PWM) Rules 2016 (copy enclosed) to give thrust to plastic waste management including source segregation, processing and disposal of plastic waste based on the "Polluter Pays Principle"

As per Section 9 of PWM Rules, Producers, Importers & Brand Owners (PIBOs) who introduce plastic waste in the market due to their products in form of carry bags, multi-layered packaging, plastic sheets or like, are required to fulfill Extended Producer Responsibility to ensure environmentally sound management of this plastic waste.

The PIBOs are further required to obtain Registration from concerned State Pollution Control Board (SPCB)/ Pollution Control Committee (PCC) or Central Pollution Control Board in accordance with Section 13(2) of the PWM Rules which provides that:

"Every producer or brand-owner shall, for the purpose of registration or for renewal of registration, make an application in Form-I to

i. *"The concerned State Pollution Control Board or Pollution Control Committee of the Union territory, if operating in one or two States or Union Territories"; or*
ii. *"The Central Pollution Control Board, if operating in more than two States or Union Territories"*

For effective implementation of the above, you are requested to get the necessary instructions issued to the concerned to ensure verification of registration obtained from CPCB/SPCB/PCC (as applicable) at the time of clearing the consignment of Importers of plastic carry bags/multi-layered packaging/plastic sheets or like.

Yours faithfully,

1/12/21

(Tanmay Kumar)
Chairman

Encl.: As above

[फा. सं. 17–2/2001–एचएसएमडी]

विश्वनाथ सिन्हा, संयुक्त सचिव

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 18th March, 2016

G.S.R. 320(E).—Whereas the Plastic Waste (Management and Handling) Rules, 2011 published vide notification number S.O 249(E), dated 4th February, 2011 by the Government of India in the erstwhile Ministry of Environment and Forests, as amended from time to time, provided a regulatory frame work for management of plastic waste generated in the country;

And whereas, to implement these rules more effectively and to give thrust on plastic waste minimization, source segregation, recycling, involving waste pickers, recyclers and waste processors in collection of plastic waste fraction either from households or any other source of its generation or intermediate material recovery facility and adopt polluter's pay principle for the sustainability of the waste management system, the Central Government reviewed the existing rules;

And whereas, in exercise of the powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the draft rules, namely, the Plastic Waste Management, Rules, 2015 were published by the Government of India in the Ministry of Environment, Forest and Climate Change *vide* number G.S.R. 423(E), dated the 25th May, 2015 in the Gazette of India, inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of a period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public;

And Whereas copies of the said Gazette were made available to the public on the 25th May, 2015;

And Whereas the objections and suggestions received within the said period from the public in respect of the said draft rules have been duly considered by the Central Government**;**

NOW, Therefore, in exercise of the powers conferred by sections 3, 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), and in supersession of the Plastic Waste (Management and Handling) Rules, 2011, except as respects things done or omitted to be done before such supersession, the Central Government hereby makes the following rules, namely:-

1. Short title and commencement.- (1) These rules shall be called the Plastic Waste Management Rules, 2016.

(1) Save as otherwise provided in these rules, they shall come into force on the date of their publication in the Official Gazette.

2. Application.-(1) These rules shall apply to every waste generator, local body, Gram Panchayat, manufacturer, Importers and producer.

(2) The rule 4 shall not apply to the export oriented units or units in special economic zones, notified by the Central Government, manufacturing their products against an order for export: Provide this exemption shall not apply to units engaged in packaging of gutkha, tobacco and pan masala and also to any surplus or rejects, left over products and the like.

3. Definitions.- In these rules, unless the context otherwise requires.-

(a) **"Act"** means the Environment (Protection) Act, 1986 (29 of 1986);

(b) **"brand owner"** means a person or company who sells any commodity under a registered brand

label.

(c) **"carry bags"** mean bags made from plastic material or compostable plastic material, used for the purpose of carrying or dispensing commodities which have a self carrying feature but do not include bags that constitute or form an integral part of the packaging in which goods are sealed prior to use.

(d) **"commodity"** means tangible item that may be bought or sold and includes all marketable goods or wares;

(e) "**compostable plastics**" mean plastic that undergoes degradation by biological processes during composting to yield CO_2, water, inorganic compounds and biomass at a rate consistent with other known compostable materials, excluding conventional petro-based plastics, and does not leave visible, distinguishable or toxic residue;

(f) **"consent"** means the consent to establish and operate from the concerned State Pollution Control Board or Pollution Control Committee granted under the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974), and the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981);

(g) "**disintegration**" means the physical breakdown of a material into very small fragments;

(h) **"extended producer's responsibility "** means the responsibility of a producer for the environmentally sound management of the product until the end of its life;

(i) **"food-stuffs"** mean ready to eat food products, fast food, processed or cooked food in liquid, powder, solid or semi-solid form;

(j) **"facility"** means the premises used for collection, Storage, recycling, processing and disposal of plastic waste;

(k) **"importer"** means a person who imports or intends to import and holds an Importer -Exporter Code number, unless otherwise specifically exempted.

(l) **"institutional waste generator"** means and includes occupier of the institutional buildings such as building occupied by Central Government Departments, State Government Departments, public or private sector companies, hospitals, schools, colleges, universities or other places of education, organisation, academy, hotels, restaurants, malls and shopping complexes;

(m) "**manufacturer"** means and include a person or unit or agency engaged in production of plastic raw material to be used as raw material by the producer.

(n) **"multilayered packaging"** means any material used or to be used for packaging and having at least one layer of plastic as the main ingredients in combination with one or more layers of materials such aspaper, paper board, polymeric materials, metalised layers or aluminium foil, either in the form of a laminate or co-extruded structure;

(o) **"plastic"** means material which contains as an essential ingredient a high polymer such as polyethylene terephthalate, high density polyethylene, Vinyl, low density polyethylene, polypropylene, polystyrene resins, multi-materials like acrylonitrile butadiene styrene, polyphenylene oxide, polycarbonate, Polybutylene terephthalate;

(p) **"plastic sheet"** means Plastic sheet is the sheet made of plastic;

(q) **"plastic waste"**means any plastic discardedafter use or after their intended use is over;

(r) **"prescribed authority"** means the authorities specified in rule 12;

(s) **"producer"** means persons engaged in manufacture or import of carry bags or multilayered packaging or plastic sheets or like, and includes industries or individuals using plastic sheets or like or covers made of plastic sheets or multilayered packaging for packaging or wrapping the commodity;

(t) **"recycling"** means the process of transforming segregated plastic waste into a new product or raw material for producing new products;

(u) **"registration"** means registration with the State Pollution Control Board or Pollution Control Committee concerned, as the case may be;

(v) **"street vendor"** shall have the same meaning as assigned to it in clause (l) of sub-section (1) of Section 2 of the Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 (7 of 2014);

(w) **"local body"** means urban local body with different nomenclature such as municipal corporation, municipality, nagarpalika, nagarnigam, nagarpanchayat, municipal council including notified area committee (NAC) and not limited to or any other local body constituted under the relevant statutes such as gram panchayat, where the management of plastic waste is entrusted to such agency;

(x) **"virgin plastic"** means plastic material which has not been subjected to use earlier and has also not been blended with scrap or waste;

(y) **"waste generator"** means and includes every person or group of persons or institution, residential and commercial establishments including Indian Railways, Airport, Port and Harbour and Defense establishments which generate plastic waste;

(z) **"waste management"** means the collection, storage, transportation reduction, re-use, recovery, recycling, composting or disposal of plastic waste in an environmentally safe manner;

(aa) **"waste pickers"** mean individuals or agencies, groups of individuals voluntarily engaged or authorised for picking of recyclable plastic waste.

4. Conditions.- (1) The manufacture, importer stocking, distribution, sale and use of carry bags, plastic sheets or like, or cover made of plastic sheet and multilayered packaging, shall be subject to the following conditions, namely:-

a) carry bags and plastic packaging shall either be in natural shade which is without any added pigments or made using only those pigments and colourants which are in conformity with Indian Standard : IS 9833:1981 titled as "List of pigments and colourants for use in plastics in contact with foodstuffs, pharmaceuticals and drinking water", as amended from time to time;

b) Carry bags made of recycled plastic or products made of recycled plastic shall not be used for storing, carrying, dispensing or packaging ready to eat or drink food stuff';

c) carry bag made of virgin or recycled plastic, shall not be less than fifty microns in thickness;

d) plastic sheet or like, which is not an integral part of multilayered packaging and cover made of plastic sheet used for packaging, wrapping the commodity shall not be less than fifty microns in thickness except where the thickness of such plastic sheets impair the functionality of the product;

e) the manufacturer shall not sell or provide or arrange plastic to be used as raw material to a producer, not having valid registration from the concerned State Pollution Control Boards or Pollution Control Committee;

f) sachets using plastic material shall not be used for storing, packing or selling gutkha, tobacco and pan masala;

g) recycling of plastic waste shall conform to the Indian Standard: IS 14534:1998 titled as Guidelines for Recycling of Plastics, as amended from time to time;

h) The provision of thickness shall not be applicable to carry bags made up of compostable plastic. Carry bags made from compostable plastics shall conform to the Indian Standard: IS 17088:2008 titled as Specifications for Compostable Plastics, as amended from time to time. The manufacturers or seller of compostable plastic carry bags shall obtain a certificate from the Central Pollution Control Board before marketing or selling; and

i) plastic material, in any form including Vinyl Acetate - Maleic Acid - Vinyl Chloride Copolymer, shall not be used in any package for packaging gutkha, pan masala and tobacco in all forms.

5. Plastic waste management.- (1) The plastic waste management by the urban local bodies in their respective jurisdiction shall be as under:-

(a) plastic waste, which can be recycled, shall be channelized to registered plastic waste recycler and recycling of plastic shall conform to the Indian Standard: IS 14534:1998 titled as Guidelines for Recycling of Plastics, as amended from time to time.

(b) local bodies shall encourage the use of plastic waste (preferably the plastic waste which cannot be further recycled) for road construction as per Indian Road Congress guidelines or energy recovery or waste to oil etc. The standards and pollution control norms specified by the prescribed authority for these technologies shall be complied with.

(c) Thermo set plastic waste shall be processed and disposed off as per the guidelines issued from time to time by the Central Pollution Control Board.

(d) The inert from recycling or processing facilities of plastic waste shall be disposed of in compliance with the Solid Waste Management Rules, 2000 or as amended from time to time.

6. Responsibility of local body.- (1) Every local body shall be responsible for development and setting up of infrastructure for segregation, collection, storage, transportation, processing and disposal of the plastic waste either on its own or by engaging agencies or producers.

(2) The local body shall be responsible for setting up, operationalisation and co-ordination of the waste management system and for performing the associated functions, namely:-

(a) Ensuring segregation, collection, storage, transportation, processing and disposal of plastic waste;

(b) ensuring that no damage is caused to the environment during this process;

(c) ensuring channelization of recyclable plastic waste fraction to recyclers;

(d) ensuring processing and disposal on non-recyclable fraction of plastic waste in accordance with the guidelines issued by the Central Pollution Control Board;

(e) creating awareness among all stakeholders about their responsibilities;

(f) engaging civil societies or groups working with waste pickers; and

(g) ensuring that open burning of plastic waste does not take place.

(3) The local body for setting up of system for plastic waste management shall seek assistance of producers and such system shall be set up within one year from the date of final publication of these rules in the Official Gazaette of India.

(4) The local body to frame bye-laws incorporating the provisions of these rules.

7. Responsibility of Gram Panchayat.- (1) Every gram panchayat either on its own or by engaging an agency shall set up, operationalise and co-ordinate for waste management in the rural area under their control and for performing the associated functions, namely,-

(a) ensuring segregation, collection, storage, transportation, plastic waste and channelization of recyclable plastic waste fraction to recyclers having valid registration; ensuring that no damage is caused to the environment during this process;

(b) creating awareness among all stakeholders about their responsibilities; and

(c) ensuring that open burning of plastic waste does not take place

8. Responsibility of waste generator.- (1) The waste generator shall.-

(a) take steps to minimize generation of plastic waste and segregate plastic waste at source in accordance with the Solid Waste Management Rules, 2000 or as amended from time to time.

(b) not litter the plastic waste and ensure segregated storage of waste at source and handover segregated waste to urban local body or gram panchayat or agencies appointed by them or registered waste pickers', registered recyclers or waste collection agencies;

(2) All institutional generators of plastic waste, shall segregate and store the waste generated by them in accordance with the Municipal Solid Waste (Management and Handling) Rules, 2000 notified vide S.O. 908(E) dated the 25th September, 2000 under the Act or amendment from time to time and handover

segregated wastes to authorized waste processing or disposal facilities or deposition centers either on its own or through the authorized waste collection agency.

(3) All waste generators shall pay such user fee or charge as may be specified in the bye-laws of the local bodies for plastic waste management such as waste collection or operation of the facility thereof, etc.;

(4) Every person responsible for organising an event in open space, which involves service of food stuff in plastic or multilayered packaging shall segregate and manage the waste generated during such events in accordance with the Municipal Solid Waste (Management and Handling) Rules, 2000 notified vide
S.O. 908(E) dated the 25th September, 2000 under the Act or amendment from time to time.

9. Responsibility of producers, Importers and Brand Owners.- (1) The producers, within a period of six months from the date of publication of these rules, shall work out modalities for waste collection system based on Extended Producers Responsibility and involving State Urban Development Departments, either individually or collectively, through their own distribution channel or through the local body concerned.

(2) Primary responsibility for collection of used multi-layered plastic sachet or pouches or packaging is of Producers, Importers and Brand Owners who introduce the products in the market. They need to establish a system for collecting back the plastic waste generated due to their products. This plan of collection to be submitted to the State Pollution Control Boards while applying for Consent to Establish or Operate or Renewal. The Brand Owners whose consent has been renewed before the notification of these rules shall submit such plan within one year from the date of notification of these rules and implement with two years thereafter.

(3) manufacture and use of non- recyclable multilayered plastic if any should be phased out in Two years time.

(4) The producer, within a period of three months from the date of final publication of these rules in the Official Gazette shall apply to the Pollution Control Board or the Pollution Control Committee, as the case may be, of the States or the Union Territories administration concerned, for grant of registration.

(5) No producer shall on and after the expiry of a period of Six Months from the date of final publication of these rules in the Official Gazette manufacture or use any plastic or multilayered packaging for packaging of commodities without registration from the concerned State Pollution Control Board or the Pollution Control Committees.

(6) Every producer shall maintain a record of details of the person engaged in supply of plastic used as raw material to manufacture carry bags or plastic sheet or like or cover made of plastic sheet or multilayered packaging.

10. Protocols for compostable plastic materials.-Determination of the degree of degradability and degree of disintegration of plastic material shall be as per the protocols of the Indian Standards listed in Schedule-I to these rules.

11. Marking or labelling.-(1) Each plastic carry bag and multilayered packaging shall have the following information printed in English namely,-

(a) name, registration number of the manufacturer and thickness in case of carry bag;

(b) name and registration number of the manufacturer in case of multilayered packaging; and

(c) name and certificate number [Rule 4(h)] in case of carry bags made from compostable plastic

(2) Each recycled carry bag shall bear a label or a mark "recycled" as shown below and shall conform to the Indian Standard: IS 14534: 1998 titled as "Guidelines for Recycling of Plastics", as amended from time to time;

NOTE: PET-Polyethylene terephthalate, HDPE-High density polyethylene, V-Vinyl (PVC), LDPE- Low density polyethylene, PP-Polypropylene, PS-Polystyrene and Other means all other resins and multi-materials like ABS (Acrylonitrile butadiene styrene), PPO (Polyphenylene oxide), PC (Polycarbonate), PBT (Polybutylene terephalate) etc.

Each carry bag made from compostable plastics shall bear a label "compostable" and shall conform to the Indian Standard : IS or ISO 17088:2008 titled as Specifications for "Compostable Plastics".

12. Prescribed authority.- (1) The State Pollution Control Board and Pollution Control Committee in respect of a Union territory shall be the authority for enforcement of the provisions of these rules relating to registration, manufacture of plastic products and multilayered packaging, processing and disposal of plastic wastes.

(2) The concerned Secretary-in-charge of Urban Development of the State or a Union Territory shall be the authority for enforcement of the provisions of these rules relating to waste management by waste generator, use of plastic carry bags, plastic sheets or like, covers made of plastic sheets and multilayered packaging.

(3) The concerned Gram Panchayat shall be the authority for enforcement of the provisions of these rules relating to waste management by the waste generator, use of plastic carry bags, plastic sheets or like, covers made of plastic sheets and multilayered packaging in the rural area of the State or a Union Territory.

(4) The authorities referred to in sub-rules (1) to (3) shall take the assistance of the District Magistrate or the Deputy Commissioner within the territorial limits of the jurisdiction of the concerned district in the enforcement of the provisions of these rules.

13. Registration of producer, recyclers and manufacturer,- (1) No person shall manufacture carry bags or recycle plastic bags or multilayered packaging unless the person has obtained a registration from the State Pollution Control Board or the Pollution Control Committee of the Union Territory concerned, as the case may be, prior to the commencement of production;

(2) Every producer shall, for the purpose of registration or for renewal of registration, make an application to the State Pollution Control Board or the Pollution Control Committee of the Union territory concerned, in Form I

(3) Every person recycling or processing waste or proposing to recycle or process plastic waste shall make an application to the State Pollution Control Board or the Pollution Control Committee, for grant of registration or renewal of registration for the recycling unit, in Form II.

(4) Every manufacturer engaged in manufacturer of plastic to be used as raw material by the producer shall make an application to the State Pollution Control Board or the Pollution Control Committee of the Union territory concerned, for the grant of registration or for the renewal of registration, in Form III.

(5) The State Pollution Control Board or the Pollution Control Committee shall not issue or renew registration to plastic waste recycling or processing units unless the unit possesses a valid consent under the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) along with a certificate of registration issued by the District Industries Centre or any other Government agency authorised in this regard.

(6) The State Pollution Control Board or the Pollution Control Committee shall not renew registration of producer unless the producer possesses and action plan endorsed by the Secretary in charge of Urban Development of the concerned State or Union Territory for setting of plastic waste management system.

(7) On receipt of the application complete in all respects for the registration for recycling or processing of plastic waste under sub-rule (3), the State Pollution Control Board may, after such inquiry as it considers necessary and on being satisfied that the applicant possesses appropriate facilities, technical capabilities and equipment to handle plastic waste safely, may grant registration to the applicant on fulfilment of the conditions as may be laid down in terms of registration.

(8) Every State Pollution Control Board or Pollution Control Committee shall take a decision on the grant of registration within ninety days of receipt of an application which is complete in all respects.

(9) The registration granted under this rule shall initially be valid for a period of one year, unless revoked, suspended or cancelled and shall subsequently be granted for three years.

(10) State Pollution Control Board or the Pollution Control Committees shall not revoke, suspend or cancel registration without providing the opportunity of a hearing to the producer or person engaged in recycling or processing of plastic wastes.

(11) Every application for renewal of registration shall be made at least one hundred twenty days before the expiry of the validity of the registration certificate.

14. Responsibility of retailers and street vendors- (1) Retailers or street vendors shall not sell or provide commodities to consumer in carry bags or plastic sheet or multilayered packaging, which are not manufactured and labelled or marked, as per prescribed under these rules.

(2) Every retailers or street vendors selling or providing commodities in, plastic carry bags or multilayered packaging or plastic sheets or like or covers made of plastic sheets which are not manufactured or labelled or marked in accordance with these rules shall be liable to pay such fines as specified under the bye-laws of the local bodies.

15. Explicit pricing of carry bags.- (1) The shopkeepers and street vendors willing to provide plastic carry bags for dispensing any commodity shall register with local body. The local body shall, within a period of six months from the date of final publication of these rules ion the Official Gazette of India notification of these rules, by notification or an order under their appropriate state statute or byelaws shall make provisions for such registration on payment of plastic waste management fee of minimum rupees forty eight thousand @ rupees four thousand per month. The concerned local body may prescribe higher plastic waste management fee, depending upon the sale capacity. The registered shop keepers shall display at prominent place that plastic carry bags are given on payment.

(2) Only the registered shopkeepers or street vendors shall be eligible to provide plastic carry bags for dispensing the commodities.

(3) The local body shall utilize the amount paid by the customers for the carry bags exclusively for the sustainability of the waste management system within their jurisdictions.

16. State Level Monitoring Committee.- (1) The State government or the union Territory shall, for the purpose of effective monitoring of implementation of these rules, constitute a State Level Advisory Committee consisting of the following persons, namely;-

(a)	the Secretary, Department of Urban Development	- Chairman
(b)	Director from State Department of Environment	- Member
(c)	Member Secretary from State Pollution Control Board or Pollution Control Committee	- Member
(d)	Municipal Commissioner	- Member
(e)	one expert from Local Body	- Member
(f)	one expert from Non-Governmental involved in Waste Management	- Member

(g)	Commissioner, Value Added Tax or his nominee,	- Member
(h)	Sales Tax Commissioner or Officer	- Member
(i)	representative of Plastic Association, Drug Manufacturers Association, Chemical Manufacturers Association	- Member
(j)	one expert from the field of Industry	- Member and
(k)	one expert from the field of academic institution	- Member
(l)	Director , Municipal Administration	- Convener

The State Level Advisory Body shall meet at least once in Six Month and may invite experts, if it considers necessary.

17. Annual reports.- (1) Every person engaged in recycling or processing of plastic waste shall prepare and submit an annual report in Form-IV to the local body concerned under intimation to the concerned State Pollution Control Board or Pollution Control Committee by the 30th April, of every year.

(2) Every local body shall prepare and submit an annual report in Form –V to the concerned Secretary-in-charge of the Urban Development Department under intimation to the concerned State Pollution Control Board or Pollution Control Committee by the 30th June, every year.

(3) Each State Pollution Control Board or Pollution Control Committee shall prepare and submit an annual report in Form VI to the CPCB on the implementation of these rules by the 31st July, of every year.

(4) The CPCB shall prepare a consolidated annual report on the use and management of plastic waste and forward it to the Central Government along with its recommendations before the 31st August of every year.

SCHEDULE-I

[See rule 10]

1.	IS / ISO 14851: 1999 Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium-Method by measuring the oxygen demand in a closed Respirometer
2.	IS / ISO 14852: 1999 Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium-Method by analysis of evolved carbon dioxide
3.	IS / ISO 14853: 2005 Plastics- Determination of the ultimate anaerobic biodegradation of plastic materials in an aqueous system-Method by measurement of biogas production
4.	IS /ISO 14855-1: 2005 Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions-Method by analysis of evolved carbon dioxide (Part-1 General method)
5.	IS / ISO 14855-2: 2007 Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions-Method by analysis of evolved carbon dioxide (Part-2: Gravimetric measurement of carbon dioxide evolved in a laboratory- scale test)
6.	IS / ISO 15985: 2004 Plastics- Determination of the ultimate anaerobic biodegradation and disintegration under high-solids anaerobic digestion conditions- Methods by analysis of released biogas
7.	IS /ISO 16929: 2002 Plastics- Determination of degree of disintegration of plastic materials under defined composting conditions in a pilot - scale test
8.	IS / ISO 17556: 2003 Plastics- Determination of ultimate aerobic biodegradability in soil by measuring the oxygen demand in a Respirometer or the amount of carbon dioxide evolved
9.	IS / ISO 20200:2004 Plastics- Determination of degree of disintegration of plastic materials under simulated composting conditions in a laboratory - scale test

FORM - I

[See rules 13 (2)]

APPLICATION FOR REGISTRATION FOR PRODUCERS or Brand Owners

From: .....

.....

.....(Name and full address of the occupier)

To

The Member Secretary,

.....Pollution Control Board or Pollution Control Committee

.....

.....

Sir,

I /We hereby apply for registration under rule 9 of the Plastic Waste Management Rules, 2015

1. Producers

	PART – A GENERAL	
1.(a)	Name and location of the unit	
(b)	Address of the unit	
(c)	Registration required for manufacturing of: (i) Carry bags; (a) petro- based, (b) Compostable (ii) Multilayered plastics	
(d)	Manufacturing capacity	
(e)	In case of renewal, previous registration number and date of registration	
2.	Is the unit registered with the District Industries Centre of the State Government or Union Territory? If yes, attach a copy.	
3.(a)	Total capital invested on the project	
(b)	Year of commencement of production	
4. (a)	List and quantum of products and by-products	
(b)	List and quantum of raw materials used	
5.	Furnish a flow diagram of manufacturing process showing input and output in terms of products and waste generated including for captive power generation and water.	
6.	Status of compliance with these rules- Thickness – fifty micron (Yes/No)	
	PART – B PERTAINING TO LIQUID EFFLUENT AND GASEOUS EMISSIONS	
7.	(a) Does the unit have a valid consent under the Water (Prevention and control of Pollution) Act, 1974 (6 of 1974)? If yes, attach a copy	
	(b) Does the unit have a valid consent under the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981)? If yes, attach a copy	
	PART – C PERTAINING TO WASTE	
8.	Solid Wastes or rejects: (a) Total quantum of waste generated (b) Mode of storage within the plant (c) Provision made for disposal of wastes	
9.	Attach or Provide list of person supplying plastic to be used as raw material to manufacture carry bags or plastic sheet of like or multilayered packaging	

10.	Attach or provide list of personnel or Brand Owners to whom the products will be supplied	
11.	Action plan on collecting back the plastic wastes	
		Name and Signature Designation
Date : Place :		

II Brand Owners:

	PART – A GENERAL	
1.	Name, Address and Contact number	
2	In case of renewal, previous registration number and date of registration	
3	Is the unit registered with the District Industries Centre of the State Government or Union Territory? If yes, attach a copy.	
4.(a)	Total capital invested on the project	
(b)	Year of commencement of production	
5. (a)	List and quantum of products and by-products	
(b)	List and quantum of raw materials used	
	PART – B PERTAINING TO LIQUID EFFLUENT AND GASEOUS EMISSIONS	
5	Does the unit have a valid consent under the Water (Prevention and control of Pollution) Act, 1974 (6 of 1974)? If yes, attach a copy	
6	Does the unit have a valid consent under the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981)? If yes, attach a copy	
	PART – C PERTAINING TO WASTE	
7.	Solid Wastes or rejects: (c) Total quantum of waste generated (d) Mode of storage within the plant (d) Provision made for disposal of wastes	
8.	Attach or Provide list of person supplying plastic material	
9	Action plan on collecting back the plastic wastes	
		Name and Signature Designation
Date : Place :		

FORM - II

[see rule 13 (3)]

APPLICATION FORM FOR REGISTRATION OF UNITS ENGAGED IN PROCESSING OR RECYCLING OF PLASTIC WASTE

1.	Name and Address of the unit	
2.	Contact person with designation, Tel./Fax /email	

3.	Date of commencement					
4.	No. of workers (including contract labour)					
5.	Consents Validity	a. Water (Prevention & Control of Pollution) Act, 1974; Valid up to _____ b. Air (Prevention & Control of Pollution) Act, 1981; Valid up to_____ c. Authorization ; valid up to ….				
6.	Manufacturing Process	Please attach a flow diagram of the manufacturing process flow diagram for each product.				
7.	Products and installed capacity of production (MTA)	Products		Installed capacity		
8.	Waste Management:	S. No.	Type	Category	Qty.	
	a. Waste generation in processing plastic-waste	(i)				
		(ii)				
		(iii)				
	b. Waste Collection and transportation (attach details)					
	c. Waste Disposal details	S. No.	Type	Category	Qty	
		(i)				
		(ii)				
	d. Provide details of the disposal facility, whether the facility is authorized by SPCB or PCC					
	e. Please attach analysis report of characterization of waste generated (including leachate test if applicable)					
9.	Details of plastic waste proposed to be acquired through sale, auction, contract or import, as the case may be, for use as raw material	(i) Name (ii) Quantity required /year				
10.	Occupational safety and health aspects	Please provide details of facilities				
11.	Pollution Control Measures					
	Whether the unit has adequate pollution control systems or equipment to meet the standards of emission or effluent.	If Yes, please furnish details				
	Whether unit is in compliance with conditions laid down in the said rules.	Yes/No				
	Whether conditions exist or are likely to exist of the material being handled or processed posing adverse immediate or delayed impacts on the environment.	Yes/No				
	Whether conditions exist (or are likely to exist) of the material being handled or processed by any means capable of yielding another material (e.g. leachate) which may possess eco-toxicity.	Yes/No				
12.	Any other relevant information including fire or accident mitigative measures					
13.	List of enclosures as per rule					

Name and Signature

Designation

Date :

Place :

FORM - III

[See rules 13(4)]

APPLICATION FOR REGISTRATION FOR MANUFACTURERS OF PLASTIC RAW MATERIALS

From: .....

……

…….(Name and full address of the occupier)

To

The Member Secretary,

.....……. Pollution Control Board or Pollution Control Committee

……..

……..

Sir,

I/We hereby apply for registration under the Plastic Waste Management Rules, 2011

PART – A GENERAL		
1.(a)	Name and location of the unit	
(b)	Address of the unit	
(c)	In case of renewal, previous registration number and date of registration	
2.	Is the unit registered with the DIC or DCSSI of the State Government or Union Territory? If yes, attach a copy.	
3.(a)	Total capital invested on the project	
(b)	Year of commencement of production	
(c)	List of producers and quantum of raw materials supplied to producers	
Date : Place :		Name and Signature Designation

Form - IV

[See rules 17 (1)]

FORMAT OF ANNUAL REPORT BY OPERATOR OF PLASTIC WASTE PROCESSING OR RECYCLING FACILITY TO THE LOCAL BODY

Period of Reporting:

(1)	Name and Address of operator of the facility	
(2)	Name of officer in-charge of the facility (Telephone/Fax/Mobile/ E-mail)	
(3)	Capacity:	
(4)	Technologies used for management of plastic waste:	
(5)	Quantity of plastic waste received during the year being reported upon along with the source	
(6)	Quantity of plastic waste processed (in tons): - Plastic waste recycled(in tons) - Plastic waste processed (in tons) - Used (in tons)	
(7)	Quantity of inert or rejects sent for final disposal to landfill sites:	
(8)	Details of land fill facility to which inert or rejects were sent	

	for final disposal: - Address -Telephone	
(9)	Attach status of compliance to environmental conditions, if any specified during grant of Consent or registration	

Signature of Operator

Dated :

Place:

Form - V

[See rules 17(2)]

FORMAT FOR ANNUAL REPORT ON PLASTIC WASTE MANAGEMENT TO BE SUBMITTED BY THE LOCAL BODY

Period of Reporting:

(1)	Name of the City or Town and State:	
(2)	Population	
(3)	Area in sq. kilometers	
(4)	Name & Address of Local body Telephone No. Fax No. E-mail:	
(5)	Total Numbers of the wards in the area under jurisdiction	
(6)	Total Numbers of Households in the area under jurisdiction	
(7)	Number of households covered by door to door collection	
(8)	Total number of commercial establishments and Institutions in the area under jurisdiction -Commercial establishments - Institutions	
(9)	Number of commercial establishments and Institutions covered by door to door collection -Commercial establishments - Institutions	
(10)	Summary of the mechanisms put in place for management of plastic waste in the area under jurisdiction along with the details of agencies involved in door to door collection	
(11)	Attach details of infrastructure put in place for management of plastic waste generated in the area under jurisdiction	
(12)	Attach details of infrastructure required, if any along with justification	
(13)	Quantity of Plastic Waste generated during the year from area under jurisdiction (in tons)	
(14)	Quantity of Plastic Waste collected during the year from area under jurisdiction (in tons)	
(15)	Quantity of plastic waste channelized for recycling during the year (in tons)	
(16)	Quantity of plastic waste channelized for use during the year (in tons)	
(17)	Quantity of inert or rejects sent to landfill sites during the year (in tons)	
(18)	Details of each of facilities used for processing and disposal of plastic waste **Facility-I** i) Name of operator ii) Address with Telephone Number or Mobile iii) Capacity iv) Technology Used v) Registration Number vi) Validity of Registration (up to)	

Name of the SPCB or PCC	Estimated Plastic Waste generation Tons Per Annum (TPA)	No. of registered Plastic Manufacturing or Recycling (including multilayer, compostable) units. (Rule 9)			No. of Unregistered plastic manufacturing Recycling units. (in residential or unapproved areas)	Details of Plastic Waste Management (PWM) e.g. Collection, Segregation, Disposal (Co-processing road construction etc.) (Rules 6) (Attach separate	Partial or complete ban on usages of Plastic Carry Bags (through Executive Order) (Attach copy of notification or executive order)	Status of Marking Labelling on carry bags (Rule 8) [Specify the number of units or not complied)c omplied	Explicit Pricing of carry bags (Rule 10)	Details of the meeting of State Level Advisory Body (SLA) along with its recommend-dations on Implemen-tation (Rule 11)	No. of violations and action taken on non-compliance of provisions of these Rules	Number of Municipal Authority or Gram Panchayat-under jurisdiction and Submission of Annual Report to CPCB (Rule 12)
		Plastic units	Compostable Plastic Units	Multilayer Plastic units								

	Facility-II i) Name of operator ii) Address with Telephone Number or Mobile iii) Capacity iv) Technology Used v) Registration Number Validity of Registration (up to)	
(19)	Give details of: Local body's own manpower deployed for collection including street sweeping, secondary storage, transportation, processing and disposal of waste.	
(20)	Give details of: Contractor or concessionaire's manpower deployed for collection including street sweeping, secondary storage, transportation, processing and disposal of waste.	
(21)	Mention briefly, the difficulties being experienced by the local body in complying with provisions of these rules including the financial constrains, if any	
(22)	Whether an Action Plan has been prepared for improving solid waste management practices in the city? If yes (attach copy) Date of revision:	

Signature of CEO or Municipal Commissioner or

Executive Officer or Chief Officer

Date:

Place:

Form-VI

STATE-WISE STATUS OF IMPLEMENTATION OF PLASTIC WASTE MANAGEMENT RULES, 2016 FOR THE YEAR … ANNUAL REPORT Format

						sheet)						
(1)	(2)	(3)			(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)

[F. No. 17-2/2001-HSMD]

BISHWANATH SINHA, Jt. Secy.

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Item No. 07 Court No. 1

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Original Application No. 607/2024

News Item titled "In Lucknow,s waste - side story plastic peril paints grim picture" appearing in The Hindustan Times dated 22.04.2024

Date of hearing: 11.09.2024

CORAM: HON'BLE MR. JUSTICE PRAKASH SHRIVASTAVA, CHAIRPERSON
HON'BLE MR. JUSTICE ARUN KUMAR TYAGI, JUDICIAL MEMBER
HON'BLE DR. A. SENTHIL VEL, EXPERT MEMBER

ORDER

Respondents: Ms. Sthavi Asthana, Adv. for UPPCB
Ms. Suman Arora, Adv. for CPCB (Through VC)

1. In this original application, registered *suo motu*, the Tribunal is examining the issue of generation of nearly 300 MT of plastic waste in lucknow city every day as mentioned in the news item dated 22.04.2024. The news item also states that there was a fivefold jump from 59 tons in 2015 to 300 MT of plastic waste generation in the city in 2024. Vide order dated 27.05.2024 the Tribunal had impleaded respondent and issued notice.

2. Reply dated 10.09.2024 has been filed by Respondent No. 1 UPPCB. The reply is based upon some information provided by the Environmental Engineer Nagar Nigam Lucknow to the effect that the total waste generated in Lucknow city is approximately 99 tons per day. The reply does not reflect that the UPPCB made any attempt to crosscheck such information nor does it reflect how Nagar Nigam Lucknow assessed the quantity of waste generated in Lucknow city.

3. On the basis of the information so provided by the Nagar Nigam Lucknow a stand has been taken by the UPPCB that out of 99 tons per day, 86 tons per day is processed. It mentions that a penalty of Rs. 15.26 lakhs was imposed on the defaulters and recovered.

4. We find that the UPPCB has filed the reply mechanically without undertaking any exercise to ascertain the figures relating to the generation and processing of plastic waste in the city of Lucknow.

5. The news item, based on which suo motu cognizance has been taken, states about the disclosure made by the Environmentalist. It also refers to certain reports of CPCB and mentions the serious adverse effects of plastic waste on the soil quality and health of the residents. Therefore, before taking any stand and filing the reply the UPPCB was expected to carry out the groundwork meticulously and ascertain the correct position.

6. Learned Counsel for the UPPCB seeks three weeks to file a fresh report, keeping in view the observations made above.

7. Having regard to the above, we also implead additional respondent as under:

Respondent No. 5: Commissioner, Municipal Corporation, Lucknow.

8. The office is directed to serve the newly added respondent.

9. Newly added respondent is directed to file a response/reply by way of affidavit before the Tribunal at least one week before the next date of hearing through e-filing. If any respondent directly files the reply without routing it through his advocate then the said respondent will remain virtually present to assist the Tribunal.

10. List on 12.12.2024.

Prakash Shrivastava, CP

Arun Kumar Tyagi, JM

Dr. A. Senthil Vel, EM

September 11, 2024
O.A. No. 607/2024
HB..

Item No. 07 Court No. 1

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Original Application No. 607/2024

News Item titled "In Lucknow's waste - side story plastic peril paints grim picture" appearing in The Hindustan Times dated 22.04.2024

Date of hearing: 27.05.2024

CORAM: HON'BLE MR. JUSTICE PRAKASH SHRIVASTAVA, CHAIRPERSON
HON'BLE MR. JUSTICE ARUN KUMAR TYAGI, JUDICIAL MEMBER
HON'BLE DR. AFROZ AHMAD, EXPERT MEMBER

ORDER

1. This original application is registered *suo motu* on the basis of the news item titled "In Lucknow's waste - side story plastic peril paints grim picture" appearing in 'The Hindustan Times' dated 22.04.2024.

2. The news item relates to the issue of rising plastic waste in Lucknow, Uttar Pradesh. As per the article, nearly 300 metric tonnes of plastic waste is generated in Lucknow every day. This is a fivefold jump from the 59 tonnes in 2015. The news item states that plastic waste poses a threat to human health, depletes nutritional quality of soil and raises concerns about the long-term environmental impact. The news item states that despite the ban on single use plastic in Lucknow, plastic is posing a serious health hazard as modernisation and consumerism disturb the environmental equilibrium. The news item states that nearly 300 metric tonnes of plastic waste is generated by households and commercial establishments in Lucknow every day out of the total 1,500 metric tonnes of solid waste daily. In other words, plastic constitutes 20% of the daily waste in the state capital. The article alleges that a 2015 study by CPCB revealed that soil samples from post-monsoon dumpsites

were more basic (alkaline) than those from the pre-monsoon period, indicating an increase in alkalinity due to accumulated plastic waste. The high plastic content in dumped waste and low infiltration capacity of hard soil caused water logging, further degrading the soil's quality. As per the news item, since plastic does not biodegrade but breaks down into micro-particles, it poses a serious threat to wildlife and human health. It further states that studies have linked plastic pollution to various health issues, including cancer, hormone disruption, and heart damage. Furthermore, plastic waste has been found in the blood of newborn babies, emphasizing the pervasiveness of plastic pollution in the environment.

3. The news item raises substantial issue relating to compliance of the environmental norms, especially the Solid Waste Management Rules, 2016 and the Environment (Protection) Act, 1986.

4. Power of the Tribunal to take up the matter *suo-motu* has been recognized by the Hon'ble Supreme Court in the matter of *"Municipal Corporation of Greater Mumbai vs. Ankita Sinha & Ors." reported in 2021 SCC Online SC 897.*

5. Hence, we implead the following as respondents in the matter:

(1). Uttar Pradesh Pollution Control Board, through its Member Secretary, Building No. TC-12V, Vibhuti Khand, Gomti Nagar, Lucknow - 226010.

(2). Central Pollution Control Board, through its Member Secretary, Parivesh Bhawan, East Arjun Nagar, Delhi-110032.

(3). Ministry of Environment, Forest and Climate Change, Regional Office Lucknow, through its Deputy Director

General, Integrated Regional Office, Kendriya Bhawan, 5th Floor, Sector H, Aliganj, Lucknow 226020, Uttar Pradesh.

(4). District Magistrate, Lucknow, Room No. 49, DM Office, Qaiserbagh, Lucknow 226001, Uttar Pradesh.

6. Issue notice to the above respondents for filing their response at least one week before the next date of hearing.

7. List on 11.09.2024.

Prakash Shrivastava, CP

Arun Kumar Tyagi, JM

Dr. Afroz Ahmad, EM

May 27, 2024
Original Application No. 607/2024
DV