ICPE
INDIAN CENTRE FOR PLASTICS IN THE ENVIRONMENT

Quarterly Publication of Indian Centre for Plastics in the Environment
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# ECO-Echoes

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# *Disposal of Plastics Waste through Co-processing in Cement Kilns*



Edited and Published by Mr. T. K. Bandopadhyay and Printed by him for and on behalf of Indian Centre for Plastics in the Environment, Olympus House, 2nd Floor, 25, Raghunath Dadaji Street, Fort, Mumbai - 400 001.

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**Mr. S. K. Ray,** Sr. Executive Vice President (Polymers), Reliance Industries Ltd., has taken over as Executive Secretary, Member – Executive Committee, ICPE, since January 2009 – following the superannuation of Mr. Sujit Banerji from his services in RIL.

## EDITORIAL

Benefits of plastics have been acknowledged by one and all in the modern world. Various Issues and Myths on Safety and Toxicity of plastics have been addressed adequately and the Realities have been brought out. It was realised that the issue of Solid Waste Management including Plastics Waste Management needed real attention to find out an amicable solution.

While local / civic authorities are trying to find out the solution, ICPE attempted to find out an environment friendly and scientific solution to a segment of plastics waste, which otherwise is found uncollected by waste pickers from the MSW stream creating a waste management problem. ICPE along with ACC Ltd. have established for the first time in India that All Plastics Waste could be Co-processed safely in Cement Kilns in Indian conditions. This, we believe, is a pioneering attempt in India in the direction of finding a disposal solution of low-end plastics waste. A detailed report has been brought out in this issue of the Newsletter.

In the ongoing Awareness Campaign among the school students, ICPE and Plastics Associations have addressed thousands of school students during the period. Number of Delhi and Mumbai schools were covered under the programme. A brief report has been published in this Issue.

Mr. Sujit Banerji – President, Polymers and Olefins, RIL and Executive Secretary / Member, Executive Committee – ICPE, upon his superannuation from RIL, has demitted the office of ICPE w.e.f. 31st December, 2008. We recall his immense contributions towards creating ICPE as a Nodal Agency in India for handling All Issues of Plastics in the Environment.

At the same time we welcome Mr. S. K. Ray – Senior Executive Vice President, Polymers – RIL as the Executive Secretary / Member, Executive Committee – ICPE, to lead Team ICPE to a greater height.

T. K. Bandopadhyay
*Editor*

# Disposal of Plastics Waste through Co-processing in Cement Kilns

*Disposal of Plastics Waste through Co-processing in Cement Kiln is a known and accepted process of Municipal Solid Waste Management in many developed countries.*

*ICPE had brought out brief notes on this process in its earlier Issues. More details of the process have now been brought out along with test results of the trials conducted – for the first time in India, in an ICPE sponsored project at the cement plant of the leading cement manufacturer of the country – ACC Ltd.*

– T. K. Bandopadhyay,
Sr. Technical Manager – ICPE

Due to its multifaceted benefits, use of plastics in a variety of applications has been increasing all around the world, including India. Though plastics contribute various benefits to the modern world from providing safe and hygienic packaging materials for food and food products, to conserving land, water, forests and energy resources and practically in all areas of our daily life, the management of the waste created by discarded used plastic items, especially the ones used for packaging applications has become a challenging task in developing countries. The increased use of plastics products, about 50% of which go for packaging applications alone and hence are discarded shortly after using the content has increased the quantity of plastics in the solid waste stream to a great extent. Recycling has now assumed great importance in the context of solid waste management.

*ACC & ICPE Team Members of the Project*

The new technologies and economics have come to play an important role in plastics recycling. Recycling principally refers to Recovery, which is divided into Material Recycling and Energy Recovery. Material Recycling is again divided into Mechanical and Feedstock Recycling. The choice between Mechanical Recycling, Feedstock Recycling or 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. To avoid the extra work involving extra cost and other numerous problems, proper segregation of wastes at source gives us a great ease in operation in recycling the wastes.

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 in a scientific manner without causing any environmental hazards.

Many developed / developing countries are disposing these otherwise unattended plastics waste in the Municipal solid waste stream through co-processing in Cement Kilns (Energy Recovery) and using in Blast Furnaces of Steel Industries (Feedstock Recycling) in a scientific and environmental friendly method. Conversion of all types of mixed plastics waste into Industrial Fuel (another example of Feedstock Recycling) is also a recent development. Though both processes (Co-processing in Cement Kiln and Conversion to Industrial Fuel) can handle all types of plastics including laminated / multilayer plastics, without any segregation and without thorough cleaning of the waste, fresh investment is required for the Fuel Conversion route while some modifications in the Feed Section are required for the existing Cement Kilns in case of Co-processing.

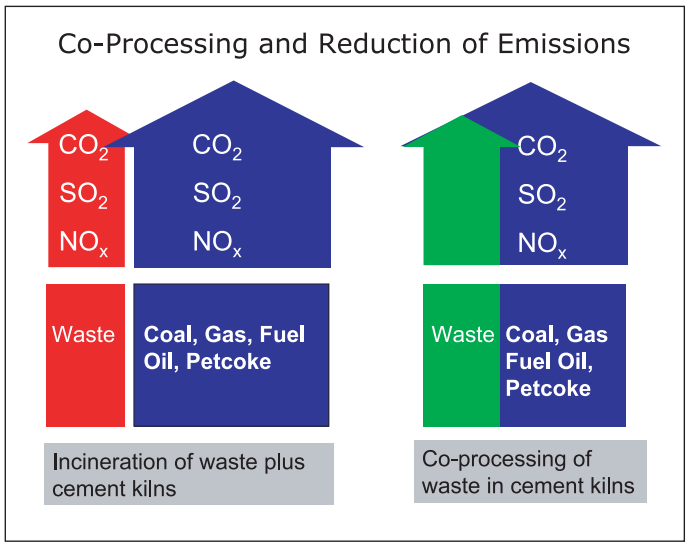
*Mr. T. K. Bandopadhyay of ICPE, Mr. Vivek Chawla & Mr. U. Parlikar - both of ACC making presentation to MPPCB*

However, in India the method of disposal of plastics waste in Cement Kilns (or in blast furnaces) are not practiced as yet. ICPE initiated a project along with the leading manufacturers of cement in the country, ACC Limited to find out the possibilities of disposing plastics waste through co-processing in the cement kilns in Indian

conditions. The project had active support from Central Pollution Control Board (CPCB). With the active cooperation and formal clearance from Madhya Pradesh Pollution Control Board (MPPCB) to conduct a trial of co-processing plastics waste in the Kaymore Plant near Katni, MP of ACC, a systematic trial was conducted during 29th-31st March, 2008 to record any possible environmental implication associated with the process.

## Trial details

Different types of plastics waste were used in the trial including – Polyethylene (LDPE / HDPE / LLDPE), Polypropylene (Homo and Copolymer), Polystyrene (GPPS and HIPS), Polyethylene Terephthalate (PET), Acrylonitrile Butadiene Styrene (ABS), Nylon, Polyacetal, Polybutylene Terephthalate (PBT), etc. PVC was excluded from the initial trial stage as the cement kiln was not equipped to handle the situation which may arise due to the possible formation of HCl or chlorine. The emission samples prior to co-processing, during co-processing and post co-processing were collected by SGS Laboratories – who are approved by CPCB for conducting such tests. The samples were tested as per the international testing protocol on the subject matter in the SGS Laboratory facilities at India and Belgium.




## Parameters monitored during each phase of the co-processing trial:

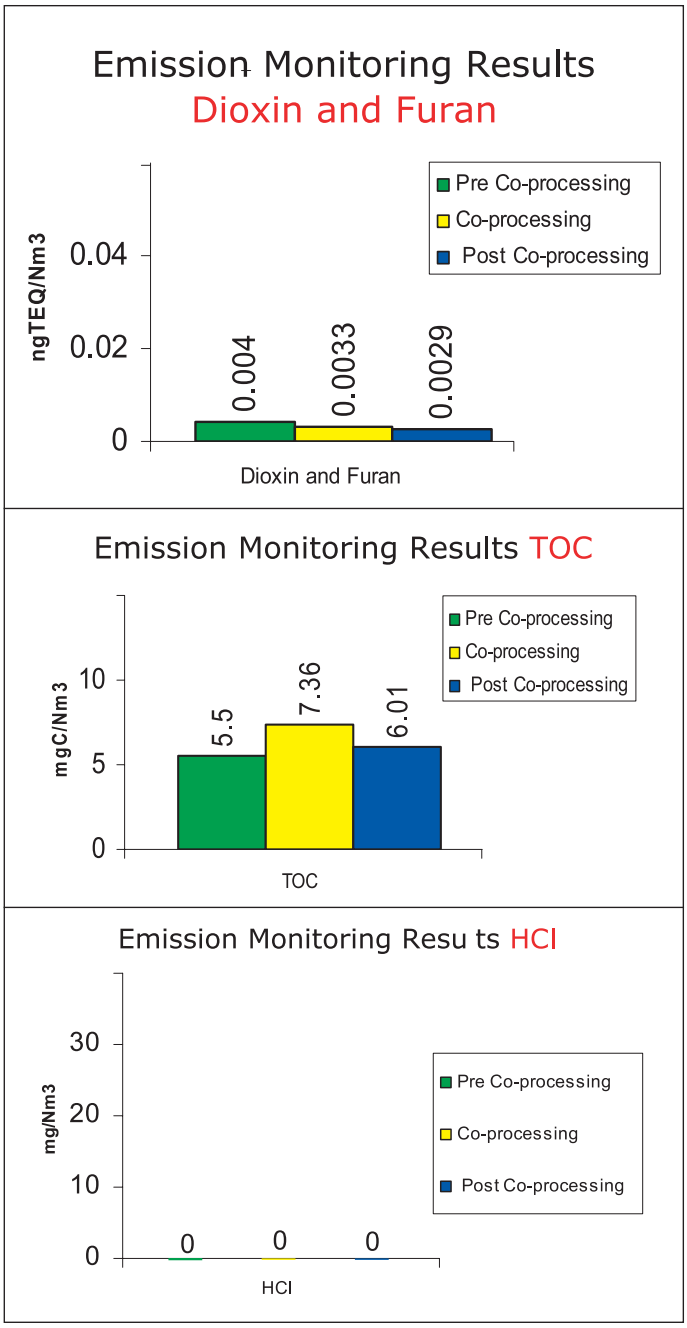
- Dioxins & Furans
- HCl
- Hg and other Heavy Metals
- $CO_2$
- NOx
- Oxygen and Moisture
- TOC
- HF
- Particulate
- CO
- $SO_2$

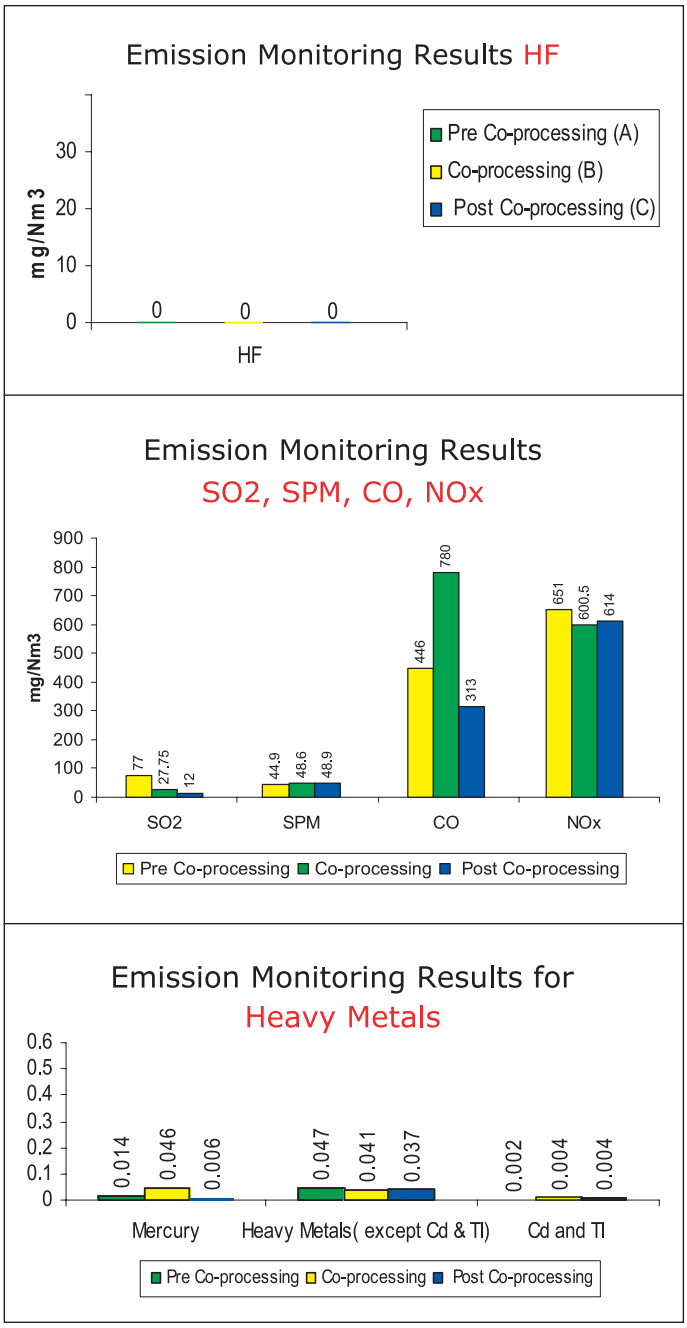
| Parameters | USEPA Method No. |
|---|---|
| Particulate | 17 |
| $CO_2$, CO, $O_2$, Moisture | 3 B |
| NOx | 7 E |
| HCl | 26 |
| HF | 26 |
| Heavy Metals | 29 |
| $SO_2$ | 6 B |
| Mercury | 29/10 1 A |
| Dioxins / Furans | 23 A |
| TOC | 25 A |

## The summary of test results is given below:

**Summary: Emission Monitoring Results**

| Parameters | Units | Stack emission during trial | | |
|---|---|---|---|---|
| | | Pre Co-processing | During Co-processing | Post Co-processing |
| Dioxins & Furans | ng/TEQ/$Nm^3$ | 0.004 | 0.0033 | 0.0029 |
| TOC | mgC/ $Nm^3$ | 5.5 | 7.36 | 6.01 |
| HCl | mg/ $Nm^3$ | ND | ND | ND |
| HF | mg/ $Nm^3$ | ND | ND | ND |
| $SO_2$ | mg/ $Nm^3$ | 77 | 27.75 | 12 |
| SPM | mg/ $Nm^3$ | 44.9 | 48.6 | 48.9 |
| CO | mg/ $Nm^3$ | 446 | 780 | 313 |
| $CO_2$ | Vol - % | 17.8 | 17.6 | 17.8 |
| NOx | mg/ $Nm^3$ | 651 | 600.5 | 614 |
| Mercury | mg/ $Nm^3$ | 0.014 | 0.046 | 0.006 |
| Metals (except Cd & Tl) | mg/ $Nm^3$ | 0.047 | 0.041 | 0.037 |
| Cd & Tl | mg/ $Nm^3$ | 0.002 | 0.004 | 0.004 |




## Discussion of the result

It is observed that the emission levels of various gaseous substances including Dioxins and Furans, TOC, Heavy Metals, SPM, $CO_2$, $SO_2$ and NOx, etc., either came down or remained within the acceptable norms.

The plastics waste used for the trial consisted of both Commodity Plastics like PE, PP, PS and Performance / Engineering Plastics like PET, ABS, Nylon, PBT, Polyacetal etc. These plastic materials represent about 99% of the plastics end products used for daily routine or special applications (PVC was not included in the study due to the reason as stated earlier). All packaging applications including laminated / multilayer pouches contain combination of some of the plastic materials used in he trial.

The result indicates that disposal / co-processing of all types of plastics waste in cement kiln in Indian condition is an environmentally safe operation.

## The volume of Plastics Waste used for the trial

The volume used for the trial could replace only about 1.5% of the fossil fuel (coal) normally used in the cement kiln. For increasing this volume to a level of 5-10%, the Cement Plant has to modify its input material conveying system by introducing Air Ducts instead of Open Belt Conveyor. However at the trial volume rate, the 170 odd cement kilns of India can co-process about 2.4 million tons of plastics waste in a year – much above the total plastics waste

generated in the country. Hence it is sufficient enough for the Indian cement kilns to co-process the plastics waste at trial volume to begin with. In the future when Indian plastics consumption will increase, the Indian Cement Plants can replace even 50% of its coal consumption by co-processing plastics waste, like developed country Germany does it in its cement kilns.

### Implementation

Madhya Pradesh Pollution Control Board has already accorded its consent to all the cement plants in the State to co-process plastics waste in their plants. It is learnt that

## MADHYA PRADESH POLLUTION CONTROL BOARD

### Roadmap for the Final Disposal of Plastics Waste adopted in the State of Madhya Pradesh

It is recommended by the committee that the plastics waste can be used as partial fuel in the Cement Kilns. The matter discussed on the 54th Conference of the Member Secretaries and Chairmen of the State Pollution Control Boards/Pollution Control Committees of the country in length. After discussion in the apex conference, the Board identified rotary Cement Kilns for incineration of non re-recyclable plastics waste as co-fuel, as a roadmap for its final disposal. One of the major cement industries in the State took lead in this regard. The trial carried out successfully from 29th-31st March, 2008 by ACC Ltd. and ICPE in presence of the officials of the State Board. The monitoring of stack Emission was carried out by SGS India.

The analysis results of the monitoring revealed that the emission values are found well below the standards set by regulatory authority for the Common Hazardous Waste Incinerators. On the basis of the study, the major cement industries of the State applied for permission for the trial run to utilise plastics waste in cement kiln as co-fuel. The work is being done with the co-ordination of local kabadis and cement industries. Permission accorded to the following cement industries in this regard:

*Presentation of Results of ICPE - ACC Project.*
*Mr. Jayant Maliya, Hon'ble Minister of Housing & Environment, M.P. and Dr. S. P. Gautam, Chairman - MPPCB (now Chairman - CPCB) are seen in the chair.*

- ACC Ltd., Kaymore, Katni for incineration of 7 to 15 MT/day plastics waste.
- Vikram Cement, Khore, Neemuch for incineration of 9125 MT/year (approx. 30 MT/day) plastics waste.
- Satna Cement Works, Satna, for incineration of 10 MT/day plastics waste.
- Maihar Cement, Maihar, Satna, for incineration of 10 MT/day plastics waste.
- Prism Cement, Manakhari, Satna, for incineration of 10 MT/day plastics waste.
- Diamond, Maihar, Narsinggarh, Damoh, for incineration of 0.5 MT/day plastics waste.
- J. P. Rewa Cement, Rewa, for incineration of 25 MT/day plastics waste.

### CALORIFIC VALUES OF DIFFERENT PLASTICS

| | MJ/Kg |
|---|---|
| Polyethylene | 46 |
| Polypropylene | 44 |
| Polyamide | 32 |
| PET | 22 |
| CA | 16 |
| **CALORIFIC VALUE OF COAL:** | **29** |

CPCB has also asked all the Pollution Control Boards in the country to implement the system in their respective States. This will pave way for civic authorities in various cities and towns in the country to find an effective alternative and scientific method of disposal of low end plastics waste in more than 170 cement kilns in the country in an environment friendly way and thus be able to solve the plastics waste management problem in a real big way. ICPE, in cooperation with ACC Ltd. has been able to demonstrate that plastics waste in India can be scientifically disposed off by co-processing in Cement Kiln in an environmentally safe method. The issue of collection and delivery of the plastics waste to the cement kilns has to be resolved by the Civic and State Government Authorities. This is expected to benefit the cement industries also as

## Workshop on Packaging Technology

October 24, 2008 • Mumbai

**Indian Institute of Packaging,** Mumbai, had organized an week long Workshop on Packaging Technology for a delegation from Sri Lankan Industry. On invitation, Mr. T. K. Bandopadhyay delivered a lecture on 'Plastics Packaging and Eco Issues' to the attending delegates.

## Forthcoming Events

**International Trade Fair on Waste Management Recycling and Environmental Technology (Waste Tech)**
2nd - 5th June, 2009
Crocus Expo International Exhibition Center,
Moscow, Russia

**InterPlas Thailand**
25th - 28th June, 2009
Bangkok International Trade & Exhibition Centre (BITEC),
Bangkok, Thailand

**Iplex**
4th - 7th September, 2009
Chennai Trade Centre, CTC Complex, Nandambakkam,
Chennai, India

**The 9th China Plastics Exhibition & Conference**
17th - 19th September, 2009
Taizhou International Convention & Exhibition Center,
Taizhou City, China

**Saudi Plas**
18th - 21st October, 2009
Riyadh Exhibition Centre, Saudi Arabia

**Indplas**
6th - 9th November, 2009
Science City, Kolkata, West Bengal, India

**Plastimagen Mexico**
23rd - 26th March, 2010
Centro Banamex, Banamex, Mexico

# Conference on Municipal Solid Waste & Plastics Waste: Issues and Solutions

Mumbai University • December 20, 2008

University of Mumbai – Life Science Department in association with ENVIS Centres of ICPE and National Solid Waste Association of India (NSWAI), had organised a One-day Conference on Municipal Solid Waste & Plastics Waste: Issues and Solutions, at its Kalina Campus on the 20th December, 2008.

The Vice Chancellor – Prof. (Dr.) Vijay Khole and the Pro Vice Chancellor – Prof. (Dr.) A. D. Sawant were very happy that ICPE and NSWAI came forward for organising such an awareness programme on the issue in Educational Institute. They assured that Mumbai University would always cooperate organising such awareness programmes in the future also.

Speakers included Prof. (Dr.) M. H. Fulekar, Head of Life Science Department, Mumbai University, Dr. Amiya Kumar Sahu – President, NSWAI, Dr. Rakesh Kumar, Regional Director of NEERI at Mumbai, Prof. Alka Zadgaonkar – Head of Applied Chemistry, Raisoni College of Engineering, Nagpur, Mr. R. K. Garg – Emiratus President, NSWAI, Mr. D. Shotriya, Executive Engineer (Retd.), Solid Waste Management, BMC, Ms. Dipti Singh, Ph.D. student of Life Science Dept., Mumbai University and Mr. T. K. Bandopadhyay of ICPE.

The Conference was attended by about 250 participants including about 150 M.Sc. students of Environment Science Course from all the 5 colleges under the University, four from Mumbai City and one from Ratnagiri District.

*Pro Vice Chancellor – Prof. (Dr.) A. D. Sawant lighting the Lamp, as mark of inauguration of the Conference. Vice Chancellor – Prof. (Dr.) Vijay Khole and others are seen in the photograph.*


*Panel Members: (L to R) Dr. Sahu, Prof. (Dr.) Fulekar, Mr. T. K. Bandopadhyay, Dr. Rakesh Kumar, Mr. D. Shotriya.*

*Prof. (Dr.) Vijay Khole*

*Prof. (Dr.) A. D. Sawant*

*Dr. Amiya Kumar Sahu*

*Prof. Alka Zadgaonkar*

*Ms. Dipti Singh*

*Section of delegates.*

DELHI

## Awareness Programmes for School Students

ICPE policy on conducting Awareness Programmes among school/ college students was explained in the earlier Issue (July-September, 2008) of ICPE Newsletter. In continuation of the policy, Awareness Programmes were conducted in following Schools/Institutions during the period October-December, 2009.

### Modern School

October 21, 2008

About 380 students of Class VI to VIII attended the programme. Also participated in the Annual Green Fair 2008 at Modern School wherein a stall was put up. Students from Classes II to XI attended the fair in batches. Around 1,200 visitors, including students, teachers and parents, attended the fair.

*Dinosaur with used plastic bottles created by students of Modern School.*



- DTEA Senior Secondary School
- Carmel Convent School

October 23, 2008

About 80 students of Class IX and 40 students of Class XI attended the programme.

### Shanti Gyan Niketan Senior Secondary Public School

October 31, 2008

Around 250 students of Class X and XI attended the programme. The school has also shown keen interest in attending Plastindia 2009 exhibition to be held early next year.

## Lady Sri Ram College

November 3, 2008

ICPE has been conducting workshops at LSR for final year graduate students regularly over the past few years. The President of the eco-club 'Prakriti' had invited ICPE again to conduct a similar programme this year as well. The programme was conducted in the Seminar Hall of the "Prakriti" Eco-society.

## Combined Awareness Programme

- Commercial Senior Secondary School,
- Hakim Ajmal Khan Girls Senior Secondary School,
- Jain Senior Secondary School,
- Ramjas Girls Senior Secondary School

November 5, 2008

Around 250 students of Class IX and XI of Commercial Senior Secondary School, Hakim Ajmal Khan Girls Senior Secondary School, Jain Senior Secondary School and Ramjas Girls Senior Secondary School and their teachers attended the programme.

## Kendriya Vidyalaya

December 6, 2008

Around 80 students of Class IX and XI classes attended the programme.

## Banyan Tree School

December 18, 2008

About 100 students and 6 teachers attended the workshop on 'Plastics and Environment' in two batches.

## 6th Vacation Programme on Environmental Resources

December 25, 2008

6th Vacation Programme on Environmental Resources organized by Aravalli Foundation of Education at the National Museum of National History, New Delhi.

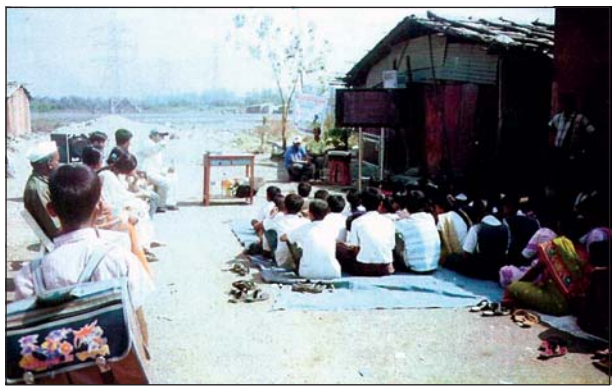
Selected school students of Class VII and VIII from about 40 schools under the Eco-Clubs Scheme of Department of Environment, Govt. of NCT of Delhi attended the programme.

MUMBAI

## Nalanda Vidyalaya

November 17, 2009

About 100 students attended the programme.



## Sardar Ballabhbhai Patel School

December 23, 2008

One Awareness Programme was organised at Sardar Ballabhbhai Patel School, Kandivali (W), Mumbai, on 20th December, 2008. Mr. Mahesh Shah, Ex-President, Plastindia Foundation and a Trusty Member of the School, took initiative in organising the programme.

Two sessions were organised – one in the morning and the other in the afternoon. The morning session was attended by about 600 students of Class VIII, IX and X and the afternoon session was attended by about 600 Junior College Students. About 25 teachers of Science and Commerce Streams also participated.

ICPE team comprised of Dr. D. D. Kale, Dr. Amya Kumar Sahu and Mr. T. K. Bandopadhyay. Mr. Mahesh Shah had delivered introductory remarks to the students.

The programme included:

- Screening of ICPE Film – Living in the Age of Plastics
- Screening of Plastindia Film – PI2009 Presentation
- PPT Presentation on Plastics and the Environment – Mr. T. K. Bandopadhyay
- Plastics Engineering as a career opportunity and Myths and Reality about Plastics
- Dr. A. K. Sahu talked on importance of Waste Management

School Books and Waste Management leaflets were distributed among all the students.

Teachers and Students came up at the end and declared that the misconception about plastics was cleared after attending the programme.

The Principal of the school had taken keen interest in making the programme successful. She suggested that if a small model of plastics recycling plant could be installed in a space provided by the school authority, the students would be immensely benefited. Mr. Mahesh Shah requested ICPE to assist him with the information so that he could take up the matter for implementation.

ICPE will make the information available to the School Authority.

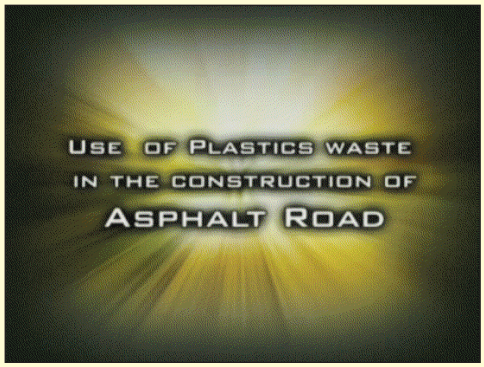

*Morning Session*

*Afternoon Session – Junior College Students*


# New Audio Visual Released

A 7-minutes AV has been produced by ICPE on **"Use of Waste Plastics in the Production of Asphalt Road".** The DVD has been forwarded to major associations / institutions for wide circulation.

## ROAD AHEAD




Road engineers have been experimenting with use of certain synthetic polymers to improve the binding property of asphalt roads. Polymer blended bitumen shows higher softening point, lower penetration value, and better ductility. Polymer coated aggregates blended with bitumen gives higher Marshall Stability value. All these aspects improve the performance criteria of asphalt road. However, the high cost of virgin synthetic polymers limited their use only in higher cost application area.

It was while looking for a cheaper and viable alternative to virgin synthetic polymers that Indian scientists stumbled across plastics waste as an effective substance. Later it also proved to be a scientific and environment-friendly method of disposal of low-end plastics waste, especially the thrown away carry bags and some varieties of one-time used plastics materials. Though plastics waste are recyclable and are collected for appropriate recycling process for conversion into various products of secondary applications, these low-end plastics waste are generally abandoned by the waste pickers due to difficulty in cleaning and segregation. Collection process of these very light weight plastics waste becomes an unviable proposition for the waste pickers.

On the other hand, these low-end plastics waste can be used for road construction without elaborate cleaning and segregation. By simple techniques, these are shredded into powdery form and mixed with hot bitumen and hot aggregate.

The aggregates are heated to a range of 170-180 degree Celsius in a hot mix plant and the shredded plastics waste is added to it. The plastics become softened and get coated over the aggregate. The hot bitumen with or without plastics waste is then added to it and mixed well. This mix is then transferred on to the road for laying. In the continuous plant, the shredded plastics waste is spread over the aggregate with the help of automatic dosing machine. The aggregate with shredded plastic enters the hot rotor, where the plastics get molten and is deposited on the surface of the aggregate in the first half of the rotor. Molten bitumen is then sprayed on the plastics coated aggregate, which is still under rotation. Such mix is then taken out and used for laying the road.

Experiments have proved that use of waste plastics increases the life of roads and at the same time the cost of construction of such roads also comes down due to the fact that cost of plastics waste is less than that of bitumen. 10 to 15% replacement of bitumen by plastics waste reduces the overall cost substantially.

India is considered a pioneer in using plastics waste for the construction of asphalt roads. Central Road Research Institute (CRRI), Delhi, Thiagarajar College of Engineering, Madurai and K. K. Polyflex, Bangalore have been working in this regard since early 2000. Hundreds of miles of roads have already been constructed in the States of Tamil Nadu, Karnataka and Kerala, using plastics waste. Industry Major – Reliance Industries Ltd. has taken keen interest in the technology and has arranged to construct such roads within its own complexes in Hazira and Vadodara. Many other organizations and Institutes like CIPET, Shriram Institute for Industrial Research (SIIR) also used this technology. Road Department of Gujarat Government has approved construction of trial roads in Vadodara and Surat.

ICPE has been encouraging the development and popularization of this technology in the country. ICPE has been working with CRRI to construct such roads in Delhi area. ICPE has also been working with the Road Engineering Department of Municipal Corporation of Greater Mumbai – MCGM since 2005 for development and popularization of construction of asphalt roads with plastics waste. A very busy road near Dadar Railway Station – Prof. V. S. Agashe Road, has been constructed using similar technology.

Plastics that normally do not get recycled due to economic and other reasons would no longer go to the landfills. In this scientific method, low-end plastics waste can be disposed off in an environment-friendly manner.


Advertisement in Times of India, New Delhi, by Government of NCT of Delhi on November 15, 2008 discouraging citizens on the use of Plastic Bags.

## ICPE response to Government of NCT of Delhi

After several months of discussions and deliberations in the decade of the 90's the Ministry of Environment of Forests has notified restriction of minimum thickness of plastic bags since 1999 as it was felt very thin bags as waste are a nuisance due to litter in India. Thicker reusable bags are not a nuisance but an economic option for the masses.

ICPE therefore submits that the correct and fair message (which is also accepted in several developed as well as developing countries) by any authority should be 'USE REUSABLE BAGS - AVOID VERY THIN PLASTIC BAGS'. This would mean use thicker cloth, jute or plastic bags so that they do not cause litter nuisance or add to choking of drains. A total ban or advice not to use any kind of plastic bag is not correct, as there are plastic bags of several varieties like Extruded thicker bags, Woven Tape bags, Non-woven Sheet bags, etc., that are tough & useful in all weather conditions.

It is hoped that the Government of NCT of Delhi would take into consideration scientific facts and view the submissions in the right perspective and drop the campaign of discouraging use of **All Types of Plastic Bags** merely because thin carry bags are littered.

*(In this connection, documents, which give a scientific explanation to the issue of plastic bags and its environmental benefits and issues, were also submitted.)*

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DO YOU KNOW?


**45 MILLION INDIAN FAMILIES receive fresh unadulterated milk in plastic pouches daily**

**Plastic Carry Bags are ENVIRONMENTALLY SAFE & on combustion emit $CO_2$ and water vapour**

# Solid Waste Management (Segregation) Projects in Mumbai Wards

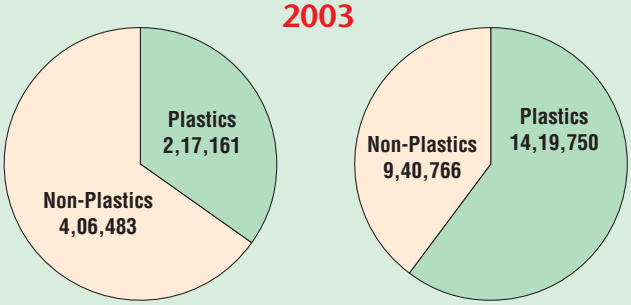



Dry Waste collection figures of select Mumbai Wards under ICPE – NGO – BMC Project for the calendar year 2008 are given below. There are about 80 waste pickers engaged in the project. Close to 1000 MTs of dry waste, which included about 250 MTs of plastics waste was collected right from the source of waste generation in selected areas of 6 Wards of Mumbai Corporation by about 80 waste pickers, earning about Rs. 46.22 lacs among themselves. Average earning per waste picker was about Rs. 4,800/- per month.

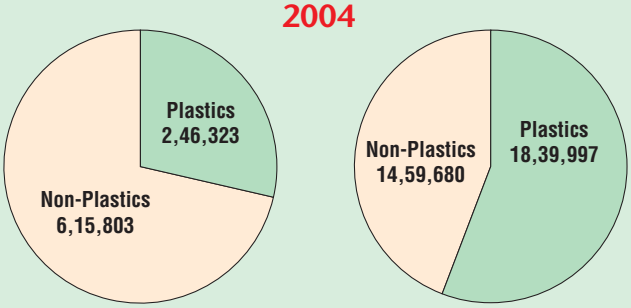
| | Weight (kgs) | | | Value (Rs.) | | |
|---|---|---|---|---|---|---|
| | Plastics | Non-Plastics | Total | Plastics | Non-Plastics | Total |
| 2007 Jan.-Dec. | 3,50,207 | 6,04,271 | 9,54,478 | 18,96,997 | 14,49,616 | 33,46,613 |
| 2008 Jan.-Dec. | 2,40,240 | 5,89,139 | 8,29,379 | 18,52,153 | 16,73,563 | 35,25,716 |
| Total Mixed Dry Waste = 2,78,915 kgs and Value is Rs. 10,97,236/ | | | | | | |

**Weight (kgs)** **Value (Rs.)**

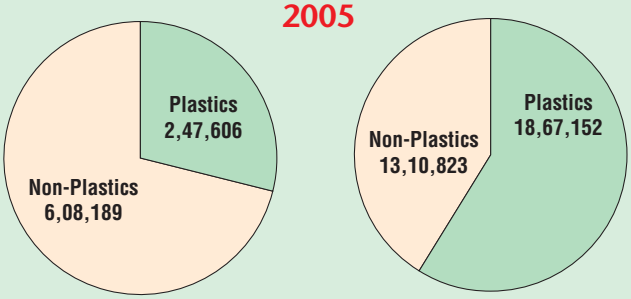
**2003**




**2004**

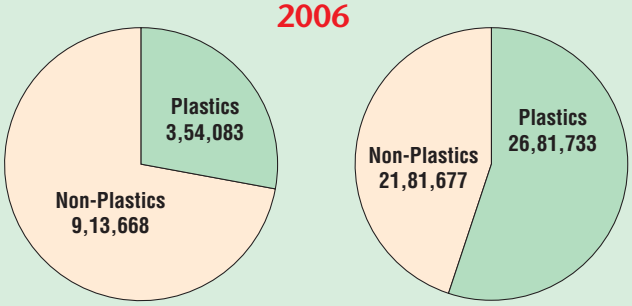



**2005**

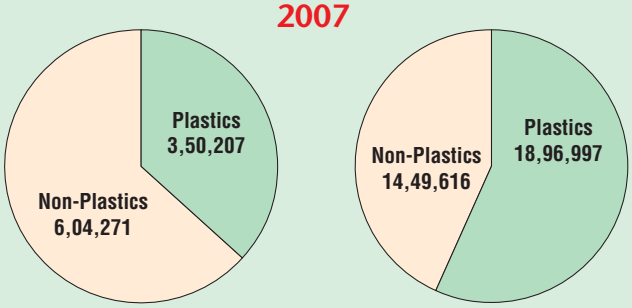



**Weight (kgs)** **Value (Rs.)**

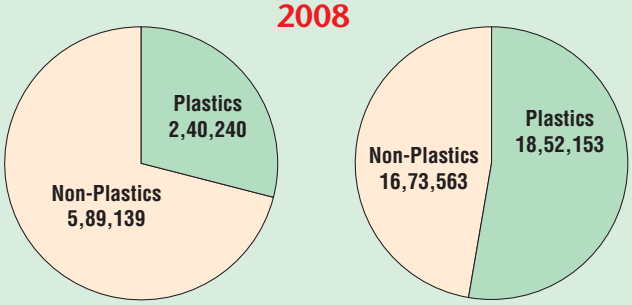
**2006**




**2007**

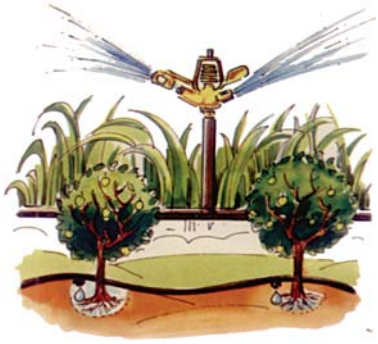



**2008**



# Let this not happen again ...


# ... for every Drop is precious



Water, a source of life and one of the precious gifts of nature is also very scarce. Water scarcity in India has resulted in environmental degradation in the form of millions of hectares of uncultivable waste and arid lands.

Eco-friendly plastics have brought about Second Green Revolution in Agriculture and Water Management. Minor and Micro Irrigation systems like sprinklers and drip using plastics help in conserving water to the tune of 40% to 70% besides improving agricultural productivity and quality of produce. Plastics have also made it possible to bring vast tracks of arid land under farming.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