



NATIONAL SOLID WASTE ASSOCIATION OF INDIA

**Special Bulletin on the occasion of
Workshop on Bio-medical Waste Management
on Saturday, April 26, 2003.**

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Co sponsored by : Municipal Corporation of Greater Mumbai (MCGM)

From The President's Desk

This Special Bulletin of the NSWAI has been the outcome of the painstaking efforts of our dedicated members. The objective of bringing out this special bulletin, coinciding with the important annual event of our Association, namely the Workshop on Biomedical Waste Management, is to bring to the notice of a wider readership, the efforts over the last fifteen months in bringing awareness on vital issues and legislations on solid waste, from specific sectors in our country through the recent few issues of the NSWAI Newsletter. Our efforts have been blessed and supported in every way by the Ministry of Environment and Forests (MoEF), New Delhi.

Sustainability of life on our planet has been attracting the attention of concerned citizens all over globe. Sustainability and significance of our efforts have been enhanced by the continued support from MoEF and also from award of its ENVIS Project. While financial support through continuing the sponsorship is on expected lines giving a kick-start to first issue (Volume 5) sponsored by MoEF. Dr. (Mrs.) Indrani Chandrasekharan, of MoEF has done a great service to NSWAI by contributing an article giving an overview of Plastic Waste in India. This extraordinary gesture has enthused the NSWAI team to be more active in spreading awareness on Solid Waste Management issues, particularly in urban centres. The subsequent issue (Volume 6) highlighted discussions on Municipal Solid Waste at the Seminar held at Mumbai in collaboration with Regional Centre for Urban & Environment Studies of the All India Institute of Local Self-Government. The next issue (Volume 7) of the newsletter dealt with the Bio-Medical Waste, which is also topic for this workshop. The fourth issue sponsored by MoEF (Volume 8 & 9) covered the problem and solutions of Tyre Industry. I am thankful to NSWAI team for preparing the special bulletin covering the important topics featured in all the earlier issues at very short notice. Reader will have an opportunity to get an idea of the ENVIS project awarded to NSWAI by MoEF at the end of this bulletin. I welcome you all to the topical workshop on Bio-medical waste and wish an effective and fruitful outcome from it.

- M. C. Badarinarayana

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MANAGEMENT OF SOLID WASTES IN INDIA

All human activities *viz.*, domestic, commercial, industrial, healthcare and agriculture generate solid waste. The quantity and nature of the waste vary with the activity and with the level of technological development in a country. Solid waste arising from human, animal, and industrial activities are discarded as useless or unwanted. However, some of the discarded waste materials are often reusable and may be considered a resource in another setting. These wastes, if not managed properly, can have an adverse impact on the environment and public health arising from contamination of soil, water and pollution of air and through spread of diseases via vectors living on waste. Ecological phenomena such as pollution of water and air have also been attributed to improper management of solid waste.

Increasing public awareness and past experience of haphazard and unregulated disposal of waste have prompted the developed and developing countries to pay due attention to the problem of waste and to adopt strategies for Integrated Solid Waste Management (ISWM). The basic goal of ISWM is to manage society's waste in a manner that meets public health and environmental concerns and to reuse and recycle waste materials to the extent practicable. In this regard, creation of awareness among the people about the adverse effects of careless disposal practices, about the need to protect the environment and public health by proper management of the waste becomes essential.

Present Status

The present status of waste management in India is far from satisfactory and a lot needs to be done. Recognising this, the Ministry of Environment and Forests (MoEF), Government

of India, have been issuing notifications and rules under the Environment (Protection) Act, 1986 for the management of different types of waste. These are:

- 1) Hazardous Wastes (Management and Handling) Rules, 1989 (amended in 2000) for Industrial Wastes,
- 2) Bio-medical Wastes (Management and Handling) Rules, 1998 for Hospital Wastes,
- 3) Recycled Plastics Manufacture and Usage Rules, 1999,
and
- 4) Municipal Solid Wastes (Management and Handling) Rules, 2000 for Municipal Wastes.

NSWAI, through its News Letter, has been bringing various aspects of solid waste management to its readers. It has also been presenting salient features of various rules relevant to solid wastes as notified by the MoEF, from time to time. Some of the features and difficulties in the implementation of various rules are highlighted here.

Hazardous Wastes

Hazardous Wastes (Management and Handling) Rules for Industrial Wastes was notified in 1989. In January 2000, certain amendments of these Rules were notified. It would appear that the amendments became necessary due to lack of clarity in the earlier rules and/or the difficulties experienced in the implementation of the rules by the industries and regulating authorities. The fact is that the management of hazardous waste till now is far from satisfactory in the country. Following the amendments of the rules, conferences and workshops have been organized by NSWAI and other organizations bringing out difficulties in definitions,

classification, implementation etc. These rules are being further amended.

Hazardous wastes mean any waste or combination of wastes of a liquid, solid, contained gaseous or semisolid form, because of its quantity, concentration, or infectious characteristics may,

- a) cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible health effects or morbidity;
- b) pose a substantial presence or potential hazard to human health or the environment when improperly treated, stored, transported or disposed off, or otherwise managed.

The mode of disposal of hazardous waste has significant impact on the health of the people and the environment.

The quantity of hazardous wastes generated in the country is reported to be 4.4 million tonnes per annum. This is not a very reliable number but it gives us an estimate and the magnitude. A significant number of hazardous waste generating units are still to be inspected and authorized by State Pollution Control Boards (SPCBs) in different States but are continuing with their operations without authorisation. There are an unknown number of units in the small scale and unorganised sector, which are handling hazardous wastes without pollution control safeguards. Quantities processed in such units are unknown. Units in Free Trade Zones are not registered.

In most States, work on the identification of waste-disposal sites is still in a preliminary stage. Majority of the authorizations granted for disposal of hazardous wastes by the SPCBs were for temporary storage of hazardous waste. The guidelines do not permit storage of such wastes for more than 90 days. In many cases, temporary storages have become permanent. There appear to be no proper action plans forthcoming from the States. A proper action plan enables the SPCB not only to deal intelligently with

hazardous wastes generated, but also reduce the generation of such wastes in the future.

Of the 11,358 units generating hazardous waste, 10,229 units have been granted authorization by the respective SPCBs. While authorizations have been granted for multiple disposal practices for units, 120 units have been granted authorization for incineration, 5,581 for storages, 413 for land disposal and 683 for other disposal options. There are 88 incinerators in the country and only 2 engineered landfills, both of them in Gujarat. Recently some more common landfill facilities have come up in Gujarat as well as in Maharashtra and Andhra Pradesh. Among the 74 sites that have been identified in various states to set up disposal facilities, so far only 14 sites have been notified. Clearly, a lot remains to be achieved in the field of hazardous waste management and regulation in India. In the light of insufficient information on the quantity and risks associated with transport, storage, treatment and disposal of hazardous wastes, there is a pressing need for Countrywide survey and inventorisation of hazardous wastes.

Bio-Medical Wastes

Bio-Medical Waste (BMW) means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining there to. BMW contain pathological waste, infectious waste, sharps, pharmaceutical waste, chemical waste, aerosols and pressurized containers and includes waste containing radioisotopes used in medical diagnostic and treatment. The Bio-Medical Wastes (Management & Handling) Rules were notified on 27th July 1998 and were amended subsequently. These Rules provide for segregation, packaging, transportation, storage, treatment and disposal of wastes generated by hospitals, clinics and laboratories. The treatment and disposal options for each of the categories are specified. The quantity of bio-medical waste generated in the country is not



estimated. There is a need to generate this number so that the magnitude of the problem can be put in a proper frame. However, it is reported that 250 g solid waste/day/bed in a hospital is generated. In Mumbai alone, there are 40,000 hospital beds reported to be there.

Segregation of the waste is the key to any waste management scheme. Segregation helps in reducing the total treatment cost, stops general waste becoming infectious, reduces the chances of infecting Health Care Worker, etc. All the waste after segregation should be stored in colour coded containers on site at the place of generation until a large and adequate quantity is accumulated to warrant treatment or until collection for transport to an off site treatment facility. Similarly, intermediate storage facility is also needed. Treatment depends upon the nature of the waste, technology that is technically and economically viable, environmentally safe and meets public acceptance. Waste treatment technologies available for bio-medical waste are incineration, autoclaving, making use of microwave etc.

BMW management has become a growing concern because of the awareness in public regarding HIV AIDS and Hepatitis B and exposure to rag pickers trying to salvage any discarded material e.g. discarded needles, syringes and other medical waste from municipal garbage bins and disposal sites for the purpose of selling them and make a living.

A central treatment facility of BMW is set up in T.B. Hospital campus situated at Sewree, Mumbai where incinerator and autoclave-shredder have been installed on BOOT (Build, Own, Operate and Transfer) basis. The BMW is collected, transported and treated on payment basis. The plant caters to and provides effective treatment to bio-medical waste generated by various municipal and private hospitals, clinics,

nursing homes, pathological laboratories, veterinary institutions and blood banks in the city of Mumbai. The present plant capacity is 5,000 kg/day with future upgradation possible to 10,000 kg/day. This facility is operational since November 2001. The majority load of BMW (~ 70%) is treated in an autoclave - a totally pollution free process, whereas the remaining (~ 30%) waste is incinerated.

BMW causes an adverse impact on human health when it is not disposed off in a scientific manner. Many large hospitals dispose off their mixed wastes within the hospital premises, where waste remains unattended in the open for a long time. Some hospitals and nursing homes have set up low-temperature incineration plants for the disposal of wastes, which quite often remain out of order as they are not managed and maintained properly. Infectious and non-infectious wastes are generally not segregated at source and instead the mixed (often wet) waste is taken to the incineration plant in a very unhygienic manner. The system of collection, transportation and disposal of bio-medical waste is thus not scientifically designed. As per the feedback given by Central Pollution Control Board (CPCB), the implementation of various provisions of the BMW Rules is far from satisfactory.

Awareness campaigns are necessary to inform small clinics and dispensaries to ensure proper management of BMW. Several States have successfully launched such awareness drives through audio-visual media. Ministry of Environment and Forests has also appointed professional agencies to launch mass awareness campaigns through electronic and print media on a number of subjects including BMW. Training of hospital staff towards proper segregation of bio-medical wastes is also necessary.

Plastic Wastes

The use of plastics in everyday life is increasing day by day. Plastics find application in domestic appliances, furniture, footwear, packaging industries, communication, transportation and various other products. Proper management of the waste remaining after the useful life of the products is over, therefore, assumes importance. Haphazard and careless methods of disposal can cause adverse environmental and health effects. Major difficulty in the disposal of plastics is their non-bio-degradability. The alternatives in the management of plastic waste in addition to land filling are: (i) mechanical recycling by melting and re-granulation of the used plastic, (ii) feed stock recycling, and (iii) energy recovery. It was estimated that in 2001, about 2 million tonnes of plastic waste was available for recycling out of which about 62 to 80 percent was manually picked up by rag pickers.

Although recycling of plastics help clean the environment by removing substantial quantity of solid waste material, use of recycled plastic in certain sectors, especially packaging or carrying ready made food stuff is not advisable. In order to curb use of recycled plastic in the packaging and carrying of ready made food stuffs, the MoEF notified the Recycled Plastics Manufacture and Usage Rules, 1999 for the manufacture and use of recycled plastic carry bag and containers. These rules prohibited the usage of carry bags or containers of recycled plastics for storing, carrying, dispensing or packaging of food stuffs. Conditions of manufacture of carry bags and container made of plastics, thickness of carry bags and condition for the use of recycling of plastics were some of the salient features of the notification. Disposal of solid waste including waste plastics through incineration and land filling causes danger to public health and safety. The recommended priorities for solid waste disposal are reduction, recycling, and recovery with land filling as a last resort.

Municipal Solid Wastes

The Municipal Solid Waste (MSW) includes commercial and residential wastes generated in a municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes. It comprises of domestic waste, commercial waste, institutional waste, street sweeping, industrial/trade waste, debris or construction rejects, waste-offal, dead animals, etc.

Scientific handling, treatment, processing and disposal of municipal solid waste has remained a highly neglected field in the country. The Municipal Solid Wastes (Management and Handling) Rules 2000 came into effect from October 3, 2000 on all the municipal corporations and municipal councils of India. After the notification, a few plants for MSW processing into compost and plants for fuel pelletisation and bio composting came up in the country, which served as study model for future options. For creation of waste treatment and processing facilities authorizations are required for setting up and operation of waste processing facility and sanitary landfill disposal facility. The authorization is given by the State Pollution Control Board or the Committee to examine the proposal taking into consideration the views of other notified agencies.

Out of estimated about 30 million tonnes/annum of urban municipal solid waste generated in the country, 8.5 million metric tonne/annum comes from nine metropolitan centres alone. Only about 60 – 80% of these wastes are collected on a daily basis and the rest is left to decay on the roads, streets and drains etc. In many urban centres, it is difficult to collect and quantify competent data from the various sources of waste generation such as households, commercial establishments, etc. The waste generated is directly related to the population and depends on many other factors. In Indian cities, the municipal solid waste is generally not weighed. It is measured by volume to determine the quantity of waste disposed off.



Several studies conducted by National Environmental Engineering Research Institute (NEERI), Nagpur show that the waste generation rates are low in smaller towns whereas they are high in cities over 20 lakh population. The range is between 200 grams per capita per day to about 600 gms per capita per day.

The management of municipal solid waste comprises of waste segregation, collection, storage, transportation, intermediate processing and treatment, transportation and the final disposal. In India, the management of waste is an obligatory function of the Urban Local Bodies (ULB) i.e. municipalities. The management of waste is poorly performed, resulting in problems of health, sanitation and environmental degradation. Infrastructure development is not in a position to keep pace with population growth owing to the poor financial health of most of the urban local bodies. Solid waste management is one among the essential services, which suffers the most in such a situation. Lack of financial resources, institutional weakness, improper choice of technology and public apathy towards solid waste management has made this service far from satisfactory.

Municipal Solid Waste, in general, is thrown into garbage bins kept on the roadsides all round the city. This is collected by the municipality and transported in the vehicles owned by municipalities or hired by them. House to house collection seems to be more attractive and this may reduce the litter all around. In addition to bins, three wheel barrows, handcarts with barrows are also in use. Presently majority of the waste vehicles are open-top models. In some cities like Mumbai closed body, auto loading bulk compactors and similar type of small satellite vehicles are initiated for collection of waste from the bins. The solid wastes are finally disposed of at landfill sites after segregation, processing, etc. Part of the urban

municipal solid waste can be processed for converting waste to energy, and/or converting biomass into organic fertilizer and finally disposed off properly in a sanitary landfill site.

Certain arbitrary norms are highly subjective and discriminatory. The requirements for sanitary landfills of non-biodegradable remnants and mixed waste are the same as required for classified hazardous industrial toxic waste i.e., with HDPE lines and leachate collection and treatment systems. On the landfill sites post closer care for 15 years is necessary after operation at the site for 25 years. Which municipal body or private agency can build in? Costs involved in creating such a facility and its recovery in long period operations specially when most of the local bodies are financially weak, is difficult. Other stipulations for landfill sites are establishment of perennial drought resistant plants which should thrive on low nutrient soil, tolerant to extremes of temperature etc. are difficult to provide.

Certain issues for rethinking are: identification of new landfill sites and making these ready for operation by December 31, 2002-extremely slow progress; and setting up of waste processing & disposal facilities by December 31, 2003 - quite difficult with the impediments and pre-conditions for authorizations / permissions.

Bibliography:

- 1) NSWAI News Letters. Vol. 4,5,6,7, and 8&9.
- 2) Tchobanoglous G., Theisen H. and Vigil S. 1993. Integrated Solid Waste Management, McGraw Hill Inc., New York
- 3) Palnitkar S. 2000. Manual on Solid Waste Management, AILSG, Mumbai.
- 4) Hack T.G. 1967. Solid waste/disease relationships. US department of Health,

Education and Welfare Solid Wastes Program
Publication SW-1C, Cincinnati, OH.

- 5) Ministry of Environment and Forests. Notification on "Municipal Solid Wastes (Management and Handling) Rules 2000".
- 6) Solid Waste Management in class I cities in India, 1999. Report of the Committee constituted by the Hon. Supreme Court of India.
- 7) Report of the Technology Advisory group on Solid Waste Management, 2002. CPHEEO, Ministry of Urban Development & Poverty Alleviation, Government of India, New Delhi.
- 8) Kewalramani N., Karande A and Palnitkar S., 1999. Training module on hospital waste management, Brihanmumbai Mahanagar Palika, Public Health Department.
- 9) Ministry of Environment and Forests, July 1998. Notification on "Biomedical Waste (Management and Handling) Rules, 1998.
- 10) Report of the High Powered Committee on Management of Hazardous Wastes, Volumes 1, 2 and 3. Chairman: Prof. M.G.K. Menon
- 11) The Hazardous Waste (Management and Handling) Rules, 1989. Notification issued on July 28, 1989 and published in the Gazette of India, Extraordinary, Part II. Subsequently amended on 5.2.90, on 31.3.92, 3.9.96 and on 6.1.2000.
- 12) Kewadaramani N., 2003. Biomedical waste disposal rules, FICCI seminars on Solid Waste Management and Energy Generation from waste.

NSWAI - ENVIS PROJECT

Ministry of Environment and Forests has identified the National Solid Waste Association of India as one of the Nodes of Environmental Information System (ENVIS) - Capacity Enhancement Programme on Urban Municipal Waste Management (UMWM). After the

memorandum of understanding was signed by MoEF and NSWAI, the Association appointed a Core committee to look after the working and progress of this ENVIS project. Under the project, NSWAI has launched a website on UMWM i.e www.nswai.com. Compilation of news items on UMWM and contributing the news items for ENVIS newsletter are part of the project. Several such news items can be viewed on the website (ENVIS). NSWAI-ENVIS has been collecting information on UMWM from urban centres in India. A questionnaire was prepared for the same and municipal bodies were approached to provide the information. All India Institute of Local Self Government has been approached for such information and their response has been very encouraging. Under UMWM, data on area of city, population, municipal waste generation, rate of generation, segregation, collection, transport and disposal is being collected

Information on waste processing, reuse, recycling, treatment etc. is also being sought.

Team of NSWAI has organised drives to collect such information from various cities by deputing its persons to the cities. Efforts have already been made in western, southern, northern and eastern regions of India. Data on more than 20 cities is already collected and is being fed to the website. To name a few cities, Mumbai, Pune, Hyderabad, Bangalore, Salem, Coimbatore, Aurangabad, Barsi, Beed, Tirupathi and others are already covered.

Website development is in its preliminary stage. When developed most of the data can be browsed on the internet. Right now, data of atleast 20 cities is available on the site.

The descriptive and technical data on the website will be freely available to municipal bodies, departments of environment, Non Governmental Organisations (NGOs), interested scientists, researchers and social workers.



NSWAI, a professional body advocating and promoting sustainable management of solid wastes in India, was established in 1996. It provides a forum for the experts and others interested in the field of solid waste management to exchange information and experience. NSWAI has been recognized by MoEF (Ministry of Environment and Forests), Govt. of India and ISWA (International Solid Waste Association), Denmark as the principal national professional body in respect of solid waste.

Right from the time of its inception, the Association has been active in contributing to the advancement of policy, promotion of common facilities, advising the Government and regulatory bodies through holding round table conferences, workshops, seminars and participating in committees entrusted with drafting Rules by the MoEF in the area of solid waste.

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