

## Mortal risk in bins

**H**azardous waste is waste with properties that make it dangerous or potentially harmful to human health or the environment. The universe of hazardous wastes is large and diverse. Hazardous wastes can consist of liquids, solids, contained gases, or sludges. They can be the by-products of manufacturing processes or simply discarded commercial products, like cleaning fluids or pesticides.

### Sources of hazardous wastes

#### ◆ Industrial wastes / improper disposal of hazardous waste

Hazardous wastes are generated by nearly every industry; those industries that themselves generate few hazardous wastes nonetheless use products from hazardous waste generating industries. For example, in the computer software industry, writing software generates little hazardous waste, but the manufacture of computers involves many industrial processes. Making a computer circuit board generates spent electroplating baths that contain metal salts, and the production of computer chips uses acids, other caustic chemicals and solvents. Other hazardous wastes are generated in the manufacture of fibre optics and copper wire used in electronic transmission, as well as magnetic disks, paper for technical manuals, photographs for packaging and publicity, and trucks for transportation of the finished product.

#### ◆ Household hazardous waste

Some jobs around the home may require the use of products containing hazardous components. Such products may include certain paints, cleaners, stains and varnishes, car batteries, motor oil, and pesticides. The used or leftover contents of such consumer products are known as "household hazardous waste."

**Effects:** Household hazardous wastes are sometimes disposed of improperly by individuals pouring wastes



down the drain, on the ground, into storm sewers, or putting them out with the trash. The dangers of such disposal methods may not be immediately obvious, but certain types of household hazardous waste have the potential to cause physical injury to sanitation workers; contaminate septic tanks or wastewater treatment systems if poured down drains or toilets; and present hazards to children and pets if left around the house.

### Source reduction alternatives around the home:

A consumer looks for ways to reduce the amount and toxicity of waste around the house. This can be done, in some cases, by using alternate methods or products without hazardous constituents to accomplish a certain task. Here are just a few ideas to get you started. Although the suggested mixtures have less hazardous ingredients than many commercial cleaners and pesticides, they should be used and stored with similar caution. Please follow the guidelines shown in table 1 for any household cleaner or pesticide.

### Characteristic wastes

Waste that does not fit in any of the listings explained above may still be considered a hazardous waste if it exhibits one of the four characteristics defined as ignitability, corrosivity, reactivity and toxicity

**Ignitability** Ignitable wastes can create fires under certain conditions; they are spontaneously combustible, or have a flash point less than 60 °C (140 °F). Examples include waste oils and used solvents. Test methods that may be used to determine ignitability include the Pensky-Martens Closed-Cup Method for Determining Ignitability

**Corrosivity** Corrosive wastes are acids or bases (pH less than or equal to 2, or greater than or equal to 12.5) that are capable of corroding metal containers, such as storage



## Message

We produce an enormous amount of hazardous waste every day. Wastes that can catch fire, corrode, explode, cause toxic fumes or are poisonous when ingested are classified as hazardous. While in most cases production of hazardous waste is inevitable in industries and households, all such waste can be disposed of effectively, economically and in an eco-friendly way as it would go a long way in improving the quality of our life & pride in our environment.

The key to solving a problem is to understand it in its totality. This Parisara newsletter on hazardous waste provides all relevant information in a capsule form. It is my fond hope and belief that all school children and ecologically-conscious adults will put it to good use.

(K. M. Shivakumar)

tanks, drums, and barrels. Battery acid is an example. The test method that may be used to determine corrosivity is the Corrosivity towards steel.

**Reactivity** Reactive wastes are unstable under 'normal' conditions. They can cause explosions, toxic fumes, gases, or vapours when heated, compressed, or mixed with water. Examples include lithium-sulphur batteries and explosives. There are currently no test methods available.

**Toxicity** Toxic wastes are harmful or fatal when ingested or absorbed (e.g., containing mercury, lead, etc.). When toxic wastes are land-disposed, contaminated liquid may leach from the waste and pollute ground water. Toxicity is defined through a laboratory procedure called the Toxicity Characteristic Leaching Procedure (TCLP). The TCLP helps identify wastes likely to

Household cleaners and alternatives	
Household cleaner	Alternative
<b>Drain cleaner</b>	Use a plunger or plumber's snake.
<b>Oven cleaner</b>	Clean spills as soon as the oven cools using steel wool and baking soda; for tough stains, add salt (do not use this method in self-cleaning or continuous-cleaning ovens).
<b>Glass cleaner</b>	Mix 1 tablespoon of vinegar or lemon juice in 1 quart of water. Spray on and use newspaper to wipe dry.
<b>Toilet bowl cleaner</b>	Use a toilet brush and baking soda or vinegar. (This will clean but not disinfect.)
<b>Furniture polish</b>	Mix 1 teaspoon of lemon juice in 1 pint of mineral or vegetable oil, and wipe furniture.
<b>Rug deodorizer</b>	Deodorize dry carpets by sprinkling liberally with baking soda. Wait at least 15 minutes and vacuum. Repeat if necessary.
<b>Silver polish</b>	Boil 2 to 3 inches of water in a shallow pan with 1 teaspoon of salt, 1 teaspoon of baking soda, and a sheet of aluminium foil. Totally submerge silver and boil for 2 to 3 more minutes. Wipe away tarnish. Repeat if necessary. (Do not use this method on an
<b>Plant sprays</b>	Wipe leaves with mild soap and water; rinse.
<b>Mothballs</b>	Use cedar chips, lavender flowers, rosemary, mint, or white peppercoms.

Table 1, Alternative for chemical cleaner or pesticides

leach concentrations of contaminants that may be harmful to human health or the environment.

## Hazardous waste regulations:

There are several legislations that directly or indirectly deal with hazardous waste. The relevant legislations are the Factories Act, 1948, the Public Liability Insurance Act, 1991, the National Environment Tribunal Act, 1995 and some notifications under the Environmental Protection Act (EPA) of 1986. A brief description of each of these is given below



*Land filling mechanism for hazardous waste*

Under the EPA, the Ministry of Environment and Forest (MoEF) has issued several notifications to tackle the problem of hazardous waste management. These include:

- ◆ Hazardous Wastes (Management and Handling) Rules, 1989, which brought out a guide for manufacture, storage and import of hazardous chemicals and for management of hazardous wastes.
- ◆ Biomedical Waste (Management and Handling) Rules, 1998, were formulated along parallel lines, for proper disposal, segregation, transport etc. of infectious wastes.
- ◆ Municipal Wastes (Management and Handling) Rules, 2000, whose aim is to enable municipalities to dispose of municipal solid waste in a scientific manner.
- ◆ Hazardous Wastes (Management and Handling) Amendment Rules, 2000, a recent notification issued with the view to providing guidelines for the import and export of hazardous waste in the country.

### Gaps and recommendations

- ◆ Survey and inventorisation of hazardous wastes
- ◆ Setting up of hazardous wastes and treatment facility
- ◆ Identification of sites for disposal
- ◆ Insufficient information on the quantity and risks associated
- ◆ Inadequate monitoring and enforcement of regulations;
- ◆ Lack of awareness of the risk to health, safety and environment; and
- ◆ Lack of proper infrastructure for safe

containment/disposal.

- ◆ Survey and inventorisation of hazardous wastes
- ◆ Setting up of hazardous wastes and treatment facility
- ◆ Identification of sites for disposal
- ◆ Insufficient information on the quantity and risks associated;
- ◆ Inadequate monitoring and enforcement of regulations;
- ◆ Lack of awareness of the risk to health, safety and environment; and
- ◆ Lack of proper infrastructure for safe containment / disposal

### Hazardous waste management in India

There has been a significant increase in the quantities of municipal solid wastes and hazardous waste generated in India over the last few decades. The largest quantities of hazardous waste are generated by the following industries: petrochemicals, pharmaceuticals, pesticides, paints and dyes, petroleum, fertilisers, asbestos, caustic soda, inorganic chemicals, and general engineering. The rate of generation of solid waste in urban centres has outpaced population growth in recent years with the wastes normally disposed of in low-lying areas of the city's outskirts.

The Government has promulgated various rules and guidelines on the management and handling of hazardous waste. These rules are implemented through the state pollution control boards (SPCBs) and pollution control committees in states and the union territories. The following strategies are recommended for improving the management of hazardous and solid waste.

◆ Ensure the scientific management of hazardous waste including its generation, segregation, transportation, treatment and disposal. The strategy should also target waste minimization / reduction as its primary focus.

◆ More efforts towards quantifying and characterising the volume of waste generated by industries. Training and building the capacity of SPCB officials are required to prepare such an inventory of waste.

◆ Comprehensive environmental and social assessments of hazardous waste management operations are needed to minimise the impacts of waste on human health and the ecosystem.

◆ Develop an adequate infrastructure for the proper treatment and disposal of hazardous waste. Opportunities for setting up such facilities at the state level, addressing the willingness-to-pay issues by the participating industries, type of ownership, financial mechanisms to finance such ventures, and the extent of private sector participation need to be addressed to ensure that such facilities come into existence.

◆ Give urgent attention to reducing the generation of solid waste at source through mandatory standards and regulation, fee and tax incentives, and education and voluntary compliance.

◆ Develop technologies for waste collection, treatment, and disposal in order to ensure proper solid waste management. Community waste bins must be provided at convenient places to systematise the collection process. Private enterprises and NGOs should be actively involved in waste collection and its recycling.

◆ Governmental standards must be set up not only for disposal of waste on land but also for cleaning up contaminated soils and groundwater



*Dumping of waste in open area*

source; collection and transport of HW to the TSDF; implementation of all necessary institutional and organisational requirements.

#### **Goal**

Increase environmental protection through abatement, recycling and controlled disposal of hazardous waste in Karnataka. Set up a Hazardous Waste Management System and align economic instrument system, increase public involvement.

#### **Description**

Based on the Indian Hazardous Waste Handling and Management Rules (1989, amended 2000), the Karnataka State Pollution Control Board (KSPCB) is in the process of implementing a Hazardous Waste Management System. A Treatment, Storage and Disposal Facility (TSDF) which will be in the centre of such a system is being planned. Moreover, focus will be laid on waste minimisation and abatement efforts in the generating industries as well as recycling and re-use of waste.

The TSDF will consist of technical facilities for treatment of waste (detoxification, neutralisation, etc.) and permanent storage in an engineered and secure landfill.

All these components will be developed and installed according to international standards and security precautions. Possible emissions such as discharge of effluents, odour or other nuisance will be avoided by applying state-of-the-art technology. Simultaneously, the industries will be encouraged and enabled to implement hazardous waste minimisation strategies; seminars and workshops will be held and process changes or new technologies explained.

### **Status of hazardous waste management in Karnataka**

#### **Current action plans:**

##### **Issue**

Developing and implementing a management system suitable for the following components: Planning and constructing a Treatment, Storage and Disposal Facility (TSDF) close to the capital Bangalore, where the hazardous wastes (HW) will be scientifically treated and finally stored in an engineered and secure landfill; introduction of in-house waste minimisation strategies at

The increasing settlement of manufacturing industries and the rapid development of the economy in Karnataka are prompting the state courts and the Supreme Court to take action concerning the consequences of uncontrolled disposal of industrial waste. The Union Ministry of Environment and Forest (MoEF) together with the Karnataka State Government are to solve these problems through the intervention of KSPCB. Industries are complaining that there is no proper, regulated hazardous waste disposal site in Karnataka (as is the case in the majority of the Indian States). However, according to the Hazardous Waste Rules they are forced to segregate hazardous waste and dispose them of properly without harm to human health and environment and in a way which meets comparable international standards. There are already solutions for recycling and re-use of a few special liquid hazardous wastes such as waste oil and organic solvents or lead acid batteries, but conditioning of these wastes will need improvement.

Most small and medium sized enterprises lack know-how and incentives for in-company waste minimisation

strategies, which in many cases leads to cost savings in the manufacturing process, and to an improvement of the image as an environment friendly company, which will attract customers.

Since there is no disposal infrastructure existing yet, large industries are forced to store their hazardous waste on their land for years, but presumably most of the smaller industries' waste is disposed of via the sewage system or by uncontrolled dumping.

So far the hazardous waste generated by the industries in Karnataka has not been surveyed statistically. KSPCB only has estimated figures. HAWA will make a state wide survey and collect data on quantities and qualities of hazardous and industrial waste. This will lead to a better knowledge of the waste streams in the whole state and form the basis of an industrial waste cadastre which enables the authorities and the private sector to better plan future activities and react on changes.

The volume of hazardous waste generated is relatively slight by comparison with other states. But in view of the

State-wise status of number of units generating hazardous waste and quantities generated in waste types (recyclable, incinerable and disposable).									
Sl. No	State	No. of districts		No. of units generating waste		Quantity of waste generated (waste type) in TPA			
		Total	H. W. Units	Authorized	Total	Recyclable	Incinerable	Disposable	Total
1	Andhra Pradesh	23	22	478	501	61,820	5,425	43,853	111,098
2	Assam	23	8	18	18	-	-	166,008	166,008
3	Bihar	55	12	31	42	2,151	75	24,351	26,577
4	Chandigarh	1	1	37	47	-	-	305	305
5	Delhi	9	9	-	403	-	-	1,000	1,000
6	Goa	2	2	25	25	873	2,000	5,869	8,742
7	Gujarat	24	24	2,984	2,984	235,840	34,790	159,400	430,030
8	Haryana	17	15	42	309	-	-	31,046	31,046
9	Himachal Pradesh	12	6	71	116	-	63	2,096	2,159
10	Karnataka	27	25	413	454	47,330	3,328	52,585	103,243
11	Kerala	14	11	65	113	93,912	272	154,722	248,906
12	Maharashtra	33	33	3,953	3,953	847,436	5,012	1,155,398	2,007,846
13	Madhya Pradesh	61	38	183	183	89,593	1,309	107,767	198,669
14	Orissa	30	17	78	163	2,841	-	338,303	341,144
15	J & K	14	5	-	57	-	-	-	-
16	Pondicherry	1	1	15	15	8,730	120	43	8,893
17	Punjab	17	15	619	700	9,348	1,128	12,233	22,709
18	Rajasthan	32	27	90	344	52,578	6,747	95,000	154,325
19	Tamil Nadu	29	29	1,088	1,100	193,507	11,564	196,002	401,073
20	Uttar Pradesh	83	65	768	1,036	36,817	61,395	47,572	145,784
21	West Bengal	17	9	234	440	45,233	50,894	33,699	129,826
	<b>Total</b>	<b>524</b>	<b>374</b>	<b>11,192</b>	<b>13,003</b>				<b>4,434,257</b>

Total of recyclable, incinerable and disposable will not add up due to waste sold or otherwise disposed.

uncontrolled disposal, it represents a high hazard potential for human health and the environment. Contamination via water, soil and the atmosphere leads to destruction of the ecological balance. Moreover, it is above all the poor population groups who live in the vicinity of hazardous waste producing industries or along sewer lines, or who enter into contact with hazardous wastes as a result of illegal waste disposal sites, which are most severely affected. In addition, pollution of water resources leads to diseases, particularly among the poorer population groups who are unable to afford hygienically safe drinking water. Such diseases can also be triggered by the accumulation of pollutants in the food chain.



The TSDF will be operated by a private company that must care for collection, transport, intermediate storage, treatment, and final disposal. Some waste needs chemical or physical treatment before it can be disposed of in the landfill. The companies have to pay the cost of transport, treatment and disposal in the form of a gate fee according to the quantities of waste delivered. KSPCB will be the monitoring and enforcing authority to control the whole Hazardous Waste Management System.

### Challenges

HAWA is reacting on the challenge that Karnataka to date does not have a management system including the required technical facilities in place that enables the industries to handle their wastes in an environment-friendly way that meets international standards. HAWA will provide the necessary technical know-how to the institutions and industries involved and assist in adopting it to local conditions. This will enable them to create a modern, safe and sound disposal system.

### German project

A German Technical Co-operation Project (GTZ) for assisting Karnataka in the development of hazardous waste management infrastructure was initiated in 1995 at an estimated cost of 3 million marks (German DM) for the creation of hazardous waste disposal facility and DM 3 million for technical co-operation. In this project, the work completed includes an inventory of hazardous waste, a study of the existing status of the system, and evaluation of waste disposal alternatives with a focus on

incineration and land-filling. The study has recommended the setting up of a single centralised landfill and development of one cement kiln in the state to incinerator status.

### Conclusion

- ◆ Of the 524 districts in 21 states for which information is available, 373 districts have units which generate hazardous waste.
- ◆ These 373 districts have 13,011 units generating hazardous wastes.
- ◆ Of the 13,011 units generating hazardous waste, 11,138 units have been granted authorization. While authorizations have been granted for multiple disposal practices for units, 120 units have been granted authorization for incineration, 5,581 for storage, 413 for land disposal and 683 for other disposal options. 44,15,954 M/T of hazardous waste is generated in the country. Of this, 16,85,130 M/T is recyclable waste and 1,88,097 M/T is incinerable and 25,29,947 M/T are destined for disposal.
- ◆ There are 116 incinerators in the country and 111 landfills, all of them in Gujarat. 89 sites have been identified in various states to set up disposal facilities of which 30 sites have been notified.
- ◆ As per available information, 303 recycling units use indigenous raw material and 20 depend on imported recyclable waste. In all, 33 permissions for import of recyclable waste have been granted by the SPCBs.

Waste category	Waste type	Regulatory quantities per industry
1	Cyanide wastes	1 kg per year as cyanide
2	Metal finishing wastes	10 kg per year the sum of the specified substance calculated as pure metal
3	Waste containing water soluble chemical compounds of lead, copper, zinc, chromium, nickel, selenium, barium and antimony	10 kg per year the sum of the specified substance calculated as pure metal
4	Mercury, arsenic, thallium, and cadmium bearing wastes	5 kg per year the sum of the specified substance calculated as pure metal
5	Non-halogenated hydrocarbons including solvents	200 kg per year calculated as non-halogenated hydrocarbons
6	Halogenated hydrocarbons including solvents	50 kg per year calculated as halogenated hydrocarbons
7	Wastes from paints, pigments, glue, varnish, and printing ink	250 kg per year calculated as oil or oil emulsions
8	Wastes from dyes and dye intermediates containing inorganic chemical compounds	200 kg per year calculated as inorganic chemicals
9	Wastes from dyes and dye intermediates containing organic chemical compounds	50 kg per year calculated as organic chemicals
10	Waste oil and oil emulsions	1000 kg per year calculated as oil or oil emulsions
11	Tarry wastes from refining and tar residues from distillation or pyrolytic treatment	200 kg per year calculated as tar
12	Sludges arising from treatment of waste water containing heavy metals, toxic organics, oils, emulsions, and spent chemicals, incineration ash	Irrespective of any quantity
13	Phenols	5 kg per year calculated as phenols
14	Asbestos	200 kg per year calculated as asbestos
15	Wastes from manufacturing of pesticides, herbicides, residues from pesticides and herbicides formulation units	5 kg per year calculated as pesticides and their intermediate products
16	Acid / alkali / slurry wastes	200 kg per year calculated as acids/alkalies
17	Off-specification and discarded products	Irrespective of any quantity
18	Discarded containers and container liners of hazardous and toxic wastes	Irrespective of any quantity

### **Categories of hazardous wastes**

## **Frequently Asked Questions**

### **What are hazardous wastes?**

Hazardous wastes are any solid, liquid, or contained gaseous materials which are no longer used and, if not handled or disposed of properly could damage or pollute the land, air, or water. They can also cause injury or death to exposed individuals.

### **How do we get more people to recycle?**

Educating the public about the benefits of recycling and / or providing economic incentives will get more people involved in recycling.

### **What types of businesses generate hazardous waste?**

Many types of businesses generate hazardous waste. Some are small companies that may be located in your community. For example, the following types of businesses typically generate hazardous waste: dry cleaners, auto repair shops, hospitals, exterminators, and photo processing centres. Some hazardous waste generators are larger companies like chemical manufacturers, electroplating companies, and petroleum refineries.

### **How should household hazardous waste (e.g., paint, paint thinner, batteries, used oil) be disposed of?**

Hazardous wastes that are generated in the home, like mineral spirits and old paint, are not regulated by the federal RCRA programme. Many communities provide collection centres or pick-up services for the management of household hazardous waste. Local recycling centres or State pollution board may be able to provide more information about locations and details.

### What are the safe alternatives to hazardous materials for home use (e.g., Lawn products)?

Home owners can use products that are non-hazardous or less hazardous and should use only the amount needed for a project. Leftover material can be shared with neighbours, donated to a business, charity or government agency or given to a household hazardous waste programme.

### What are the benefits of recycling? Are there environmental and/or financial benefits that encourage recycling?

Recycling prevents the emission of many greenhouse gases and water pollutants, saves energy, supplies valuable raw materials to industry, creates jobs, stimulates the development of greener technologies, conserves resources for future generations, and reduces the need for new landfills and combustors.

### How can I reduce my unwanted agricultural chemicals?

You can minimise the amount of unwanted chemicals on your site by following a few guidelines. The tips include:

- ☛ **PLAN AHEAD** Purchase only the amount of chemical required for one growing season. When using chemicals, mix only enough material to complete the job.
- ☛ **RINSE, RINSE, RINSE** When you empty a pesticide container, triple rinse or pressure rinse the container and return the rinsate to the spray tank before completing mixing and loading. This saves you money by using all of the product in the container. It also reduces the risks to health and the environment associated with container disposal.
- ☛ **ROTATE PESTICIDE STOCK** Despite careful planning, you may have to carry over from one season to the next. Store unused pesticides



## What can you do ?

- ◆ Handle it with care (e.g. wear gloves)
- ◆ Do not burn it
- ◆ Do not spoil water
- ◆ Recycle it whenever possible
- ◆ Keep it away from children
- ◆ Collect and dispose hazardous waste properly
- ◆ Store hazardous materials properly
- ◆ Substitute hazardous materials in production



according to the label instructions and use the stored pesticide first during the next season.

- ☛ **PRODUCT EXCHANGE** If you have a usable pesticide that you don't need, distribute it to a licensed applicator who does need it.
- ☛ **EXPLORE USES** There may be opportunities to use the product in accordance with the label, but for uses other than those you originally planned.
- ☛ **PROPER DISPOSAL** Take advantage of Department of Agriculture collection programmes or have a certified professional dispose of your unusable pesticides.

### Source:

[www.ppli-info.com](http://www.ppli-info.com)  
[www.wikipedia.org](http://www.wikipedia.org)  
[www.envfor.nic.in](http://www.envfor.nic.in)  
[www.envis.neeri.res.in](http://www.envis.neeri.res.in)  
[www.epa.gov](http://www.epa.gov)

Report on Hazardous waste management in India by B. V. Babu and V. Ramakrishna, Birla Institute of Technology and Science, Rajasthan

### ENVIS Team:

Chakravarthi Mohan, K.A.S., Co-ordinator, ENVIS Centre,  
 Vijay Bhat, Programme Manager, INEP,  
 Koushik. K. N., Programme Officer, ENVIS.

## ENVIS Centre - Karnataka

Department of Forests, Ecology & Environment, Government of Karnataka  
 O/o Indo Norwegian Environment Programme, 2nd floor, Parisara Bhavan ,  
 No 49, Church Street, Bangalore - 560 001. Karnataka

Ph: 080-2559 1515 email: [enviskar@dataone.in](mailto:enviskar@dataone.in) URL: <http://www.parisaramahiti.kar.nic.in>