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- efficient production processes and good maintenance of machinery can reduce waste production. This can be achieved through adopting one of a number of Environmental Management Systems, such as ISO14001, Life-Cycle analysis; cradle-to-grave, and the reduction of illegal dumping (see Enviro Facts Business and Environment);
- recycling waste reduces pollution and can result in cost-savings, e.g. expensive, toxic heavy metals could be re-used.

Further reading

Toxic exports: The transfer of hazardous wastes from rich countries to poor countries. 2001. J. Clapp. Cornell University: New York.

National Policy on Integrated Pollution and Waste Management. 2000. Department of Environmental Affairs and Tourism: Pretoria.

For more information on the Basel Convention, visit www.unep.int

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A full set of 60 Enviro Fact sheets is available from Share-Net.

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In the quest for living and working more sustainably we have printed this enviro fact using non-toxic ink that is derived from soya, rather than petroleum. We use a wet ink process that requires no metallic toner or energy demanding heat, and solar energy, from current sunlight, rather than a fossil-fuel based, energy source.

We hope you will enjoy reading this fact sheet and join us in seeking to live more sustainably.

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Hazardous Waste

The widely used term 'hazardous waste' is difficult to define. In this fact sheet it includes substances harmful to life and the environment, i.e. wastes with any of the following characteristics: infectious, poisonous (toxic), radioactive, flammable, explosive, corrosive, carcinogenic (cancer causing), mutagenic (damages chromosomes), teratogenic (causes defects in the unborn), or bio-accumulative (accumulating in the bodies of plants and animals and thus in food chains).

Hazardous wastes are produced during industrial, medical, chemical and biological processes. Even household, office and commercial wastes contain small quantities of hazardous wastes (e.g. batteries, pesticides, bleach, paint thinners and their containers).

Examples of hazardous waste

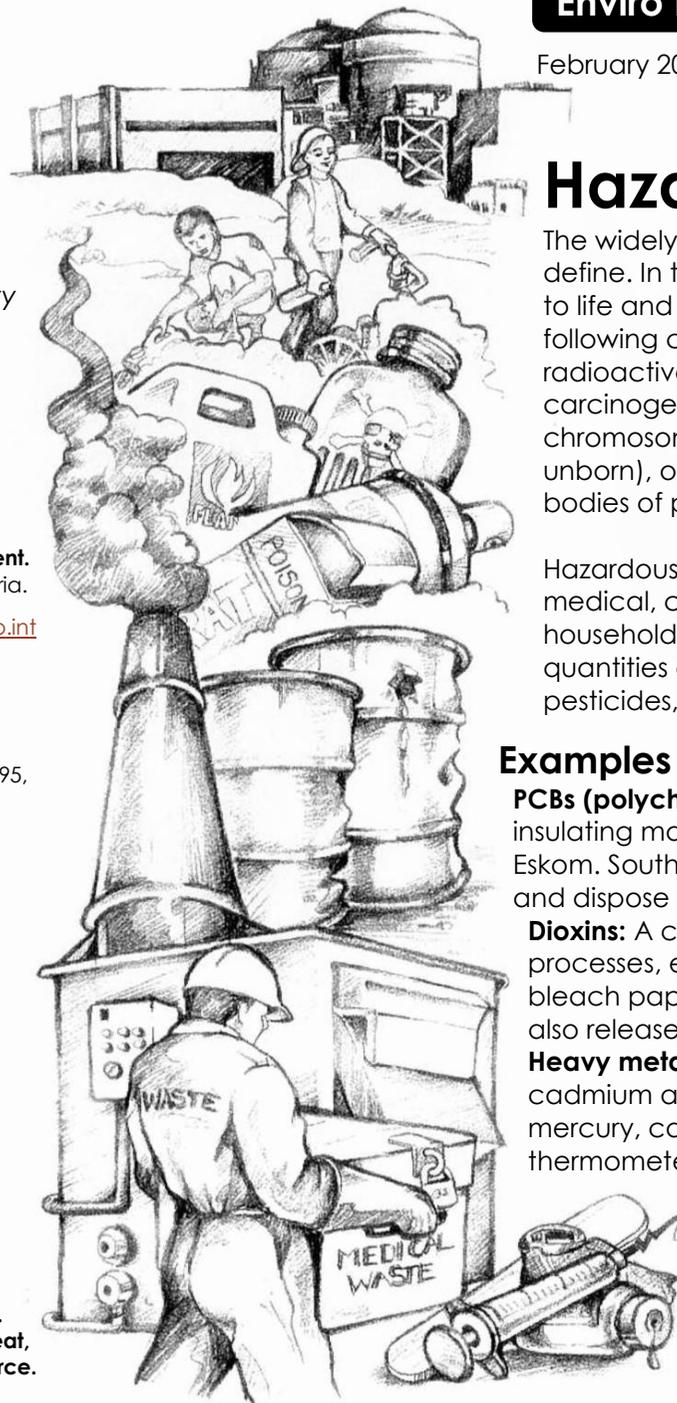
PCBs (polychlorinated biphenyls): Non-flammable, insulating materials used by big electrical networks such as Eskom. South Africa lacks the technology to safely treat and dispose of waste PCBs.

Dioxins: A carcinogenic by-product of industrial processes, e.g. incineration and refining of oil. Used to bleach paper in the paper and pulp industry. Dioxins are also released by burning plastics.

Heavy metals: Widespread industrial use, such as in cadmium and nickel plating. Found in batteries (e.g. mercury, cadmium, lead), fluorescent tubes, mercury thermometers, and leaded petrol.

Radioactive waste: By-product of nuclear power generation; and used in medicine (e.g. cancer therapy), engineering, scientific studies and military use.

Medical waste: Waste generated by health-care institutions may contain infectious pathogens, which can transmit



diseases such as tuberculosis, hepatitis and HIV/AIDS.

Biological research waste: Scientific studies and biotechnology research is generating increasing amounts of waste of plants, animals and other organisms, some of which may be genetically modified (GMOs). These may be extremely dangerous if released into nature, and so need to be carefully destroyed. Biological wastes include diseased plants and animals.

Options for treatment and disposal

There is no completely safe way of disposing of hazardous waste and the best option is the prevention and reduction of hazardous waste production, and the reuse of waste. Recently introduced minimum standards for the disposal of hazardous waste have decreased the risk of pollution, however no guarantees can be given. Some of the safer methods of dealing with hazardous waste are:

- **Land-disposal:** Waste is co-disposed (buried with domestic waste) and/or pre-treated, to neutralise it, in landfills that are designed with various layers of clay and plastic liners.
- **Encapsulation:** Waste, which cannot be pre-treated or does not biodegrade, is encapsulated in concrete.
- **Incineration (burning):** Incineration of hazardous waste is dangerous and should not be considered as an option for treating or 'disposing' of hazardous waste. Such incineration produces dioxins and furans (toxic chemicals), and releases heavy metals into the atmosphere. Most medical waste produced in South Africa is incinerated or autoclaved (sterilised with steam) by private contractors or hospitals.
- **Chemical or biological treatment:** This treatment includes adding chemicals to waste to make it less hazardous, or adding bacteria to break it down into a less toxic residue. A good example of this is the use of algae to break down liquid hazardous waste from landfills and tanneries.
- **Plasma arc conversion:** This treatment subjects waste to temperatures of approximately 4 000°C, thereby reducing it to its molecular form. This new and expensive technology produces virtually no hazardous by-products. Possible drawbacks of this process are yet to be investigated in South Africa.

International trade in hazardous waste

In the late 1980s, a tightening of environmental regulations in industrialised countries led to a dramatic rise in the cost of hazardous waste disposal. Searching for cheaper ways to get rid of the wastes, toxic traders' began shipping hazardous waste to countries from the Developing World and to eastern Europe. When this activity was revealed, international outrage led to the drafting and adoption of the

Basel Convention. During its first decade (1989-1999), the Convention was mainly devoted to setting up a framework for controlling the transboundary movements of hazardous waste (i.e. the movement of hazardous waste across international frontiers. It also developed the criteria for environmentally sound management. A control system, based on prior written notification, was also put into place.

The Bamako Convention is an OAU (Organisation of African Unity) convention – this means that it applies only within Africa. It bans the importation of hazardous waste into Africa.

South Africa is a signatory to the Basel Convention, but not the Bamako Convention (see Enviro Facts *Environmental Conventions*).

Shipping waste to other countries is no solution; it merely moves the problem. Each country should take responsibility for its own hazardous waste. Some countries like Japan accept radioactive spent nuclear fuel wastes, to reprocess it into usable nuclear fuel for their nuclear powerstations.

Hazardous waste and the law

Realising that pollution legislation (as well as other environmental legislation) was inadequate, the South African government embarked in 1994 on a major reform of all environmental laws (see Enviro Facts *Law and Environment*). Aspects of this reform process that are relevant to hazardous wastes include firstly, the establishment of an Integrated Pollution and Waste Management Committee. This committee was set up to streamline and co-ordinate pollution control and waste management legislation.

Secondly, NEMA (National Environmental Management Act) increases the ambit of people who can be held responsible for pollution damage from not only *any person, company or government department causing pollution*, to *any person, company or department owning, using or controlling the land on which the problem exists* - even if the pollution causing activity was authorised by law.

What can industry do about hazardous waste?

The ultimate solution is the reduction of hazardous waste production. This can be achieved by:

- *substitution of non-polluting alternatives, e.g. the use of chlorine to bleach wood and paper results in the formation of dioxins - chlorine could be replaced with oxygen;*