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**Toxic**

**Substances**

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KEPONE

ASBESTOS

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ESTERS

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PCT

PTHALATE

CYANIDE

NICKEL

HCBD

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MERCURY

PAH

CHLORDANE

HEPTACHLOR

LINDANE

CHLORDANE

ARSENIC

DIOXIN

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LEAD

TOXAPHENE

ARSENIC

DDT

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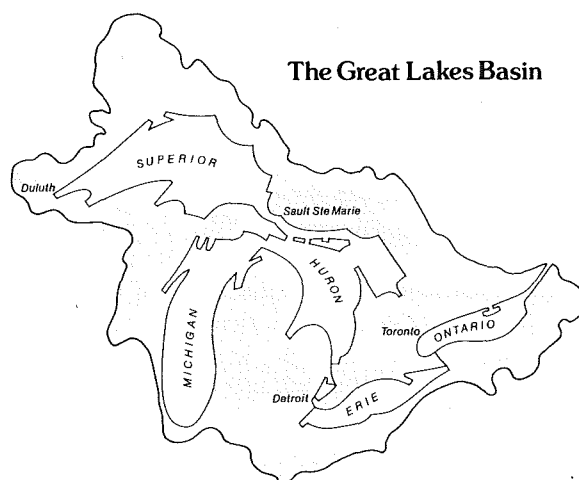
HCB

## THE SUBJECT IS POISON

When you looked at the cover of this brochure you probably thought you were looking at symbols from a high school chemistry course or were going to read about an advance in medical science. The truth is, the letters and words all represent potentially poisonous or toxic substances. All of them have been found in the Great Lakes Region. Depending on the quantities of substances and length of exposure, some of them are not very dangerous; some of them can be deadly.

Toxic substances have been defined as those chemicals which, when released into the environment, or if changed by chemical, physical and biochemical processes after release, could be detrimental to natural ecosystems or to human health. Many things can be toxic; it is dosage and exposure duration and frequency which determine whether there will be toxic effects. Substances which appear to be harmless may later prove to be toxic; substances which are toxic may degrade in the environment to levels which are not toxic under normal conditions.

Some substances which occur naturally in the Great Lakes Basin can be toxic. Until man began to use them in manufacturing and intensively discharged them, the natural system showed little if



any harmful effects. Mercury is an example. When found in the water, sediment, and finally in excessive concentrations in fish, the toxic effects were recognized.

Many toxic substances are synthetic and are manufactured in the Basin. Some 30,000 compounds of commercial and industrial significance are now on the market and being used in the Basin. According to the U.S. Environmental Protection Agency, some 1,000 new compounds are being developed each year. Toxic substances may be raw materials or finished goods; they may be by-products or wastes of manufacturing processes or residues after products are consumed. Approximately 400 toxic substances have already been identified in the Great Lakes Basin ecosystem } Of these only about 10% have been regulated.

Toxic substances which are manufactured, used and widely distributed in the Region were developed for such uses as fireproofing and insulating materials, insecticides, weed-killers, plastics, easy care fabrics, paints, varnishes, industrial and household cleaners and many others. Many toxic substances are therefore in the Great Lakes Basin ecosystem because of the market for them -- the public demand for them.

## PEOPLE AND POISONS

The effects of chemicals in the environment are varied. We learned from experience that some toxic substances can be deadly. Further research and time will clarify the effects of others. Some cause cancer; others are suspected cancer-causing agents. Certain substances can accumulate in fish, birds and other wildlife, where they can produce toxic effects on life processes such as reproduction and behavior. Contaminated fish and aquatic plants can in turn be eaten by other wildlife or human beings. Toxic substances can also cause deformities in animals -- and people -- through direct exposure or consumption of contaminated fish. The interaction of two or more substances, which may not be very toxic in themselves, may produce another substance which causes toxic effects in people and other creatures exposed to it. On the other hand, some combinations of certain toxic substances can add up to reduced toxicity.

Canadians and Americans who use the Great Lakes are increasingly concerned about the toxic substances being found there. Their concern is justified. Back yards and playgrounds in some Great Lakes communities have been declared too dangerous to use. Fishermen expect to market their catches and make a living from the lakes, but some species have been too contaminated to sell. Mothers who would like to nurse their babies have been advised that their breast milk is tainted, and they hesitate to pass on the contamination. Factory workers need to keep their jobs, but some fear the risk to their own and their families' health from years of occupational exposure to toxic substances. Some dockworkers and sailors are concerned about handling hazardous cargoes, and have seen their fears realized when spills occur and harm results.



Farmers want to boost their yields per acre, but have to recognize that the poisons which destroy pests may also destroy valuable forms of life, including those which are beneficial to farming.

Chemists discover new toxic substances in the environment each year and biologists study the effects of contamination on plants, fish and wildlife. Each year they have more questions and a few answers. Business executives are frustrated by duplicative government regulation on the production and disposal of these materials, but many acknowledge that laws are needed to protect the public from the proliferation of poisons. Government officials live with the paradox of stronger laws, unclear mandates and limited resources to enforce the regulations. People are perplexed by the apparent contradiction of being told in advertisements that they need chemicals, while at the same time having just enough information to fear environmental and health effects of many of those chemicals.

Citizens of Duluth, Minnesota; Niagara Falls (Love Canal), New York; Waukegan, Illinois; Montague, Michigan; and Elliott Lake and Mississauga, Ontario have been faced with severe toxic substances problems. A few communities have lost their sources of fresh drinking water. Some residents have had to relocate temporarily or permanently to escape the consequences of exposure to contaminated air, soil and water. People feel threatened by the manufacture of toxic substances in many areas, by the dumping of toxic wastes in some, and by the proposals to construct disposal facilities in others.



The public also is understandably alarmed about spills of hazardous materials from trucks or trains which travel roads and tracks near their homes. The frequency of accidents appears to be increasing, perhaps because of the increased diligence in reporting such spills. Contaminants may be transported or moved from one part of the Great Lakes System to another, crossing inter-state/provincial and international boundaries. Complications arise if toxic substances manufactured in one jurisdiction are disposed of or spilled in another without adequate exchange of information about them. It seems that almost no community is immune.

## WHAT IS BEING DONE?

Many government efforts are underway throughout the Great Lakes Region to clean up the present contamination from toxic substances; to discover and eliminate other sources; and to prevent further proliferation of toxic substances in the ecosystem. Organizations and coalitions are working toward these goals. Informed, caring individuals have begun to change their lifestyles by reducing consumption of products which are toxic because of their contents, manufacturing process, or waste. Many businesses and industries believe they already have technical solutions to toxic substances problems, but a skeptical public hesitates to accept the solutions. Some companies have voluntarily altered manufacturing processes, substituted less hazardous raw materials for highly toxic ones, stopped selling certain products and revised disposal practices. Some have been pressured to do so through enforcement efforts.

Prevention of further contamination of the Great Lakes Basin ecosystem from already existing wastes and those still being generated requires that safe, adequate sites for disposal or destruction of toxic substances be established. Some doubt that such sites are possible. Measures like landfilling and injecting toxic wastes below the surface of the ground are only temporary solutions. Unfortunately, these procedures do not destroy the toxic substances; they only limit the additional amounts introduced into the environment or confine them to what is believed to be a 'safe' or acceptable location. Some toxic substances can be destroyed or neutralized, but necessary facilities can be expensive to build and maintain and require careful operation.

For example, polychlorinated biphenyls (PCBs) can be destroyed by incineration, but destruction depends on reaching and maintaining a high burning temperature for a critical period of time. Therefore, few incinerators are capable of burning PCBs.

The United States and Canada have federal laws which deal with toxic materials. These laws, as well as those of provincial/state and local jurisdictions, can help to control the production, sale and disposal of toxic substances. However, their effectiveness depends upon their interpretation and enforcement.

## THE GREAT LAKES AGREEMENT

The United States and Canada developed the Great Lakes Water Quality Agreement of 1978 in an international endeavor to control toxic substances and their effects. The Agreement requires the two nations to implement programs to meet certain ecosystem objectives under the coordination of the International Joint Commission. The Agreement addresses some of the complex questions which arise from the presence, manufacture, transportation and disposal of toxic substances in the Region.

In the Agreement the two federal Governments state their common policy and commitment: "The discharge of toxic substances in toxic amounts (shall) be prohibited and the discharge of any or all persistent toxic substances (shall) be virtually eliminated".

To support that sweeping declaration, the Governments have pledged to:

- **Abide by specific objectives for quality in the boundary waters of the Great Lakes.**  
The objectives were designed to "protect the recognized most sensitive use in all waters". Two dozen persistent organic and inorganic toxic substances are listed in an Agreement annex. This annex also describes the level of those substances which should not be exceeded in order to protect water, fish or wildlife of the Great Lakes Basin ecosystem. The same annex includes objectives for eight non-persistent substances.
- **Develop "programs for abatement, control and prevention of pollution from industrial sources entering the Great Lakes System. (These programs) shall include . . . requirements for the substantial elimination of**

discharges into the Great Lakes System of persistent toxic substances.”

Several existing federal, state and provincial laws can help to achieve this goal. For instance, in addition to the Toxic Substances Control Act, the Clean Water Act, the Resource Conservation and Recovery Act and the Hazardous Materials Transportation Act in the United States and the Environmental Contaminants Act and Fisheries Act in Canada, several jurisdictions have adopted hazardous waste management acts.

- **Develop and fund methods to abate and control pollution from agriculture, forestry, and other land use activities, including measures for pest control products.**  
Farmers in Ontario and in several Great Lakes states are now involved in practices, such as minimum till farming, which reduce the loss of soil containing pesticides into streams and lakes.
- **Take “all reasonable and practical measures to rehabilitate those portions of the Great Lakes adversely affected by persistent toxic substances.”**

- **With the federal, state and provincial governments, develop an inventory of raw materials, processes, products, by-products, waste sources and emissions involving persistent toxic substances and make recommendations about their handling, use and disposal.**
- **Support monitoring and research programs to identify the presence of and help identify the impact of toxic substances on human health and aquatic life.**  
Scientists collect and analyze herring gull eggs, fish, sediments, air and water to determine the amount of certain toxic compounds present in them. The Governments are to maintain biological tissue and sediment banks which will be used for determining long term trends in the presence and effects of toxic substances. As scientific equipment and techniques continue to improve, other substances may be detected in the Great Lakes Basin ecosystem and their significance studied.
- **Establish and implement the Great Lakes**



**International Surveillance Plan to determine the effects of man's activities on the Great Lakes System.**

- **Establish an early warning system to predict the environmental characteristics of chemicals and compile and review trends in the production, import and use of chemicals.** Relevant information about the physical/chemical properties, toxicology, use and quantities of persistent toxic substances in the Great Lakes Basin ecosystem is being compiled under International Joint Commission (IJC) sponsorship.
- **Establish action levels to protect people from the human health effects of toxic substances.** For example, if authorities discover PCBs in food at greater levels than those specified, they are required to remove the items in question from the market.
- **Support research to determine the pathways, fate and effects of toxic substances.**

### **THE IJC'S ROLE**

The International Joint Commission is responsible to the Governments of Canada and the United States for monitoring, reporting and advising on actions to be taken to implement the Great Lakes Water Quality Agreement of 1978. Two major international boards, the Water Quality Board and the Science Advisory Board, assist the IJC in meeting its Agreement responsibilities.

Both boards actively seek to develop solutions to the problems of toxic substances. Subgroups of the boards work to locate, record, evaluate, and exchange data and information about the generation of materials and wastes which are toxic. A special data base is being created to help predict which substances of concern may be found in the Great Lakes Basin ecosystem in order to prevent additional problem compounds from entering the system. Periodically, a report is prepared on the status of the development and implementation of toxic substances control efforts and their effectiveness.

In 1981 the Water Quality Board reported to the Commission that current toxic substances control programs in the Great Lakes Basin were not working well, in part because there is no specific basinwide strategy to integrate and coordinate the regulatory functions of the many jurisdictions. Ranking



substances found in the Great Lakes Basin - determining which may have the greatest potential to affect human or environmental health - is a time consuming and expensive process. There is no common method used throughout the Great Lakes Region. There are no coordinated assessment processes with which to design plans of action or control measures. Sixteen recommendations were provided to the IJC. The Board advised that the Commission forward the recommendations to the Governments of Canada and the United States. The Board believes that if the Governments adopt the recommendations, there can be orderly resolution or abatement of the threats to human and ecosystem health posed by many toxic substances. Adoption would also result in more effective and efficient use of limited personnel and funds.

The Commission utilizes the reports and advice of its Great Lakes Agreement institutions when it prepares its reports, recommendations and advisories to the Governments of Canada and the United States on the implementation of the Agreement. Utilizing such advice, the IJC has expressed particular concern that comprehensive programs for the safe storage, transportation and disposal of toxic and hazardous wastes be developed, adopted and implemented. Programs will require the cooperation of many levels of government in both countries. The IJC also recommended to the Governments that "steps be taken to increase public understanding of the need for providing adequate and safe facilities and sites for the handling and disposal of such wastes, including adequate public demonstration that such sites are technically possible and environmentally safe."

In March 1980 the Commission reported to the Governments and submitted recommendations for

handling, using and disposing of toxic substances resulting from land use activities in the Great Lakes Basin (part of its charge under the Agreement of 1972). The recommendations included:

- that high priority be given to reducing toxic and hazardous wastes at the source through conservation technologies.
- that there be mandatory provision for reclaiming, reusing and recovering the wastes wherever feasible.
- that some substances not be manufactured, sold or used at all.
- that jurisdictions of the Great Lakes Basin adopt common approaches to identify and classify toxic and hazardous wastes, and develop compatible manifests to follow the wastes from the generator to the disposal facility.

The Commission also recommended that Governments accelerate implementation of existing and proposed programs, with a comprehensive and coordinated review, consisting of the following elements:

- a complete inventory of hazardous and toxic waste disposal sites in the Basin, including nature and quantities of wastes handled;
- a determination of the adequacy of the sites and any necessary alterations to make them environmentally safe;
- a review of legislation and regulations concerning establishment, operation and closure of disposal sites, including long term liability for damages and care;
- location of abandoned hazardous waste disposal sites and assessment of their potential for contaminating groundwaters and surface waters of the Basin;
- establishment of safe disposal sites in consultation with the public;
- establishment of a compatible manifest system for identification and tracing of hazardous wastes throughout the Basin.

During 1980 the Commission also advised the Governments of the potential toxic substances problems which could arise if proposed waste discharges were permitted to enter Lake Ontario and Lake Erie. The IJC questioned whether proper attention had been given to the objectives in the Great Lakes Water Quality Agreement.

Whenever the IJC reports to the Governments on the Agreement programs and problems, it also

reports to the public. The Commission's formal advisory role ends once its information and recommendations reach the Governments and the public. However, the Great Lakes Regional Office of the IJC has been charged by the Governments of Canada and the United States with the tasks of "maintaining public support for Agreement activities, keeping water quality problems in front of federal, state and provincial legislators, . . . and seeking out further opportunities to spread the message of water quality improvement."

### WHAT CAN YOU DO?

Protecting the Great Lakes ecosystem starts with individuals' doing whatever they can to promote a healthy environment. There are three basic steps: understanding the problem, knowing your community, and participating in solving the problem.

#### Understanding the Problem

The problem of toxic and hazardous



contaminants is probably the most urgent and difficult one facing residents of the Great Lakes Basin. There already is an enormous amount of information -- and misinformation -- concerning these contaminants and their potential effects on the Great Lakes Basin environment and its people. We hope that this brochure and the additional materials listed below will help you understand the complexities of the problem and the difficulties inherent in managing toxic substances.

### **Know Your Community**

Different regions within the Great Lakes Basin and different communities within given regions are now and will continue experiencing various specific problems caused by toxic and hazardous contaminants. Information about your region and community can be obtained from community educational institutions, medical centers, corporations, professional associations and libraries. You may well find experts close by. Remember that your elected representatives and local or regional government agencies also can provide valuable information and help. Through these resources and with the help of current periodicals, newspapers and broadcast media you can remain current on the nature of the problem and pending legislation and enforcement actions being taken to combat it.

### **Participate in Solving the Problem**

Broad based, responsible community action is often the most effective way to cope with the problem of toxic and hazardous contaminants. Do not assume someone else will take care of the problem. Be an informed, constructive part of a community effort. Through reading and discussions with the experts you can become better informed about which products are consistent with an environmentally sound way of life. You can join with others to share information and use it constructively for the betterment of your community. If information seems particularly useful, bring it to the attention of decision makers and concerned organizations. Whenever opportunities are presented by government or business, use the information you or your organizations have gathered to influence decisions regarding toxic substances issues. If you believe that you have observed a toxic substances problem, report the incident and location to the authorities responsible for enforcing the applicable laws and regulations. Many agencies have "hotline"



telephone numbers and will welcome your help.

Finding effective solutions to the toxic substances problems in the Great Lakes Basin ecosystem will require the support and participation of millions of people, including you!

### **READ ON**

All items are FREE and available from:  
International Joint Commission, Great Lakes  
Regional Office, 100 Ouellette Avenue, Windsor,  
Ontario N9A 6T3.

**Interim Report Under the Great Lakes Water Quality Agreement**, International Joint Commission to the Governments of the United States and Canada, January 1981. (First report under 1978 Agreement)

**Annual Report to the Governments of the United States and Canada on Great Lakes Water Quality**, International Joint Commission, December, 1980. (Final report under the 1972 Agreement)

**1981 Report**, Great Lakes Water Quality Board to the International Joint Commission. November, 1981.

**1980 Annual Report** "A perspective on the problem of hazardous substances in the Great Lakes Basin Ecosystem". Great Lakes Science Advisory Board to the International Joint Commission. November, 1980.

**1981 Report**, Toxic Substances Committee to the Great Lakes Water Quality Board. November, 1981.

For a list of additional reading materials from other sources, write to the IJC Great Lakes Regional Office.

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