A Prescription for Healthy Great Lakes

Report of the
Program for Zero Discharge

A Joint Project of the
National Wildlife Federation®

and the

Canadian Institute for Environmental Law and Policy

February, 1991

CHAPTER 4
The Failure of the Pollution Control Approach

Despite government actions aimed at controlling toxic pollution, in 1988 over 1.6 billion pounds of toxic chemicals were released into the environment or transferred off-site by U.S. industries located in the Great Lakes States. That is approximately 4.5 million pounds each day. Canadian pollution cannot even be estimated since data on cumulative toxic releases is not gathered.

These estimates understate the total releases of toxic contaminants. The U.S. data do not include small industries and commercial operations that use toxic chemicals. The figures do not reflect releases from pesticide use, run-off from farm lands and urban streets, and from leaking dumps and contaminated sediments. Nor do the reporting requirements cover all of the chemicals known to contaminate the Great Lakes.

These estimates do confirm, however, that despite all our laws, all our efforts and all our expenditures, massive amounts of toxic pollutants continue to be dumped into the environment every day. The current regulatory approach is not working.

Flaws in the Pollution Control Approach

The current regulatory approach focusses on the discharge of toxic substances. On a case-by-case basis, government agencies issue permits that, at best, require modest, incremental reductions in the concentration of a limited number of toxics being dumped into the environment.

This pollution control approach has several flaws:

1. The burden of proof is on the person trying to prevent the pollution:

In the pollution control approach, community residents, or government agencies trying to protect the environment, or workers trying to protect their health must prove that the contaminants will cause serious harm. If they cannot, the polluter is allowed to proceed.

This assumption that chemicals and discharges are innocent until proven guilty puts citizens, workers and the environment at considerable risk. It means that chemicals may be in use for many years before their dangerous impacts are known. By then it may be too late. Massive quantities of toxics have irretrievably contaminated the environment.

2. Reductions in total discharges are not required:

Attention is focussed on assessing each individual source of pollution in isolation, rather than determining the combined impacts of pollutants discharged into all parts of the environment from all sources.

In focussing on each discharge, government agencies fail to adequately assess:

(i) the current condition of the environment and society's goals for protecting or improving the overall environment;

(ii) the combined impact of discharges from other polluters, including other discharges from the same factory into the air or water; and

(iii) pollution from other kinds of sources, such as past dumping, leaking landfills, contaminated sediments and toxic fallout from the air.

As a result, total discharges of contaminants into the environment may increase, even though an individual discharge may appear insignificant.

3. Dilution is not the solution to pollution:

The pollution control approach still accepts the outdated dilution solution to meet environmental standards for toxics. Discharge permit limits are based on the *concentration* of pollutants instead of on the total amount of pollutants being discharged.

Frequently, polluters are allowed to dump massive amounts of a toxic chemical so long as it is mixed with enough water to dilute the concentration. Toxics may be diluted either by the flow of water through the plant or by discharging into a stream that has a high flow rate. Similar situations occur with air releases that are dispersed over a broad area.

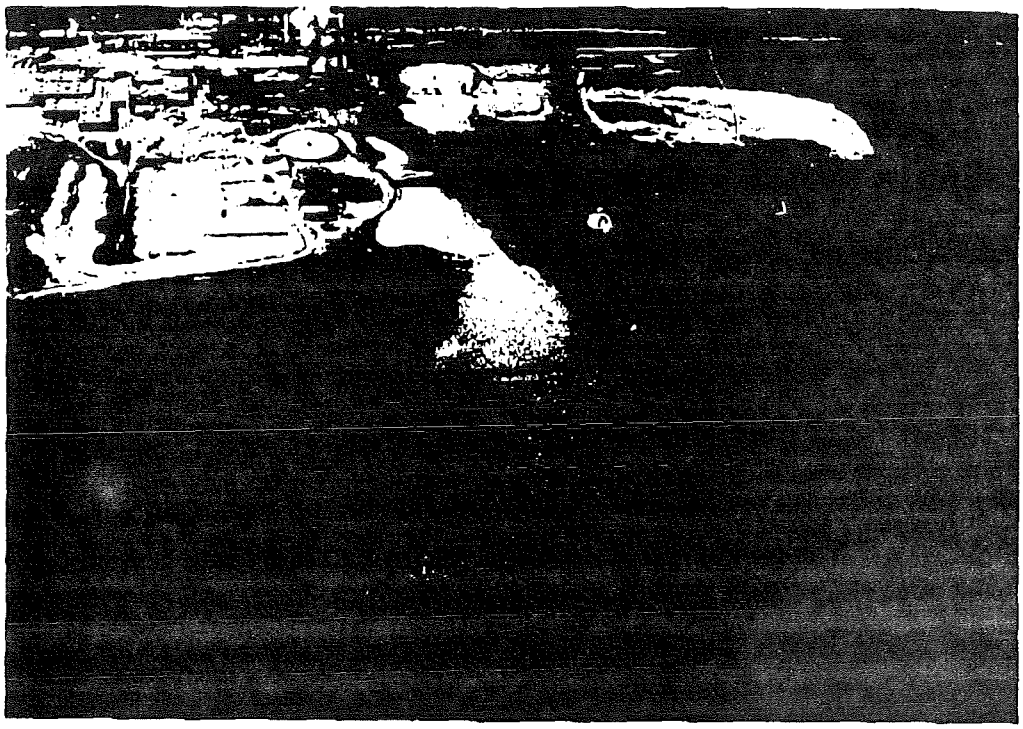
The dilution approach is myopic: while it may ensure that discharges won't immediately kill fish near the end of a pipe, it fails to consider the long-term build-up of contaminants in the environment.

Chemical Waste Releases and Transfers in the Eight Great Lakes States[1]

1988 Toxics Release Inventory Data* (in millions of pounds)		
State	No. of Generators	Total**
Ohio	1360	375
Indiana	756	276
Illinois	1229	250
Michigan	790	233
Pennsylvania	1030	201
New York	816	176
Minnesota	330	65
Wisconsin	664	105
TOTAL	6975	1681

* Plants required to report their chemical discharges in 1988 included those that manufacture at least 50,000 pounds per year or use at least 10,000 pounds per year of one or more of the chemicals on the U.S. Toxics Release Inventory list.

** Including wastes released on site and transferred to publicly-owned sewage treatment plants or other off-site facilities.



4. Pollution control focuses on end-of-the-pipe solutions:

The pollution control approach tries to trap contaminants after they are produced in the factory, but before they are released into the environment. This end-of-the-pipe approach has two fatal flaws:

(i) *Inevitably, some of the contaminants are released into the environment through the stack or pipe.* Once the toxics are created it is impossible to capture all of them. Therefore, existing pollution control regulations focus on determining acceptable levels of discharges.

This approach assumes that there is a safe or acceptable level for chemicals in the environment. Even if this were true, there is inadequate information to determine acceptable levels for all chemicals being discharged, let alone acceptable levels of multiple contaminants. The vast majority of the chemicals in use have never been tested for toxicological effects.[1]

The end-of-the-pipe approach presumes continued use of toxic chemicals. It assumes that most of the toxic substances created can be captured and that the environment can tolerate the ones that are not.

(ii) *The end-of-the-pipe approach amounts to a "toxic shell game."*

End-of-pipe technologies often prevent pollutants from getting into one part of the environment by putting them into another. For example, wastewater treatment systems collect and concentrate pollutants into a sludge. This sludge is incinerated, buried in a landfill or spread on land. Sludge disposal by these means causes pollution of the air or of ground or surface water. This transfer from one environmental medium to another is a self-defeating effort; overall pollution is not necessarily reduced.

Because most government environmental agencies have different branches controlling air, water, waste disposal, pesticides and toxic substances, requirements may vary substantially. This promotes a "toxic shell game" in which polluters merely shift wastes to the least strictly regulated discharge point.[2]

The Pollution Control Approach in the Great Lakes

The Great Lakes are particularly vulnerable to the flaws in the traditional pollution control approach.

Unlike rivers or shallow lakes that flush out fairly quickly, water stays in the Great Lakes a long time. Less than one percent of the water in the Great Lakes flows through the St. Lawrence River to the ocean each year. On average, a molecule of water stays in Lake Superior for 200 years, in Lake Michigan for 100 years, and in Lake Huron for 25 years.

In effect, the Great Lakes are giant sinks with a stopper in the drain. Toxic substances dumped into them do not quickly flush away. So the total amounts of toxics discharged to the Lakes is critical, not just the concentration.

The chemicals that create the greatest problems in the Great Lakes are those that persist a long time before breaking down and which dissolve easily in fats. These include dioxins, PCBs, and pesticides such as DDT, chlordane, dieldrin, toxaphene and mirex.

When these fat-soluble chemicals enter the Great Lakes, they are stored in the tissue of fish and other living organisms in the Lakes, instead of remaining dissolved in the water. The fish and organisms are, in turn, eaten by people and animals. The chemicals that were in the fish are then absorbed in the tissues of those who ate the fish. During this process, the chemicals become ever more concentrated. These processes are called "biomagnification."

Biomagnification can result in chemical concentrations millions of times greater in animals than in Great Lakes water. For example, the levels of PCBs in the body of a herring gull will be at least 30 million times higher than in the water inhabited by the fish that the gull ate. Seemingly harmless levels of chemicals in discharges, therefore, can become extremely dangerous to the health of wildlife and humans.

The pollution control approach to regulating discharges of chemicals largely ignores these fundamental characteristics of the Great Lakes. It cannot, therefore, achieve our vision of a healthy Great Lakes ecosystem.

Jack Vallentyne, a Canadian scientist, has enriched thousands of people, young and old, with his lessons about Great Lakes ecology. He tells this story to school children:

One hot summer day in 1890, my Grandad was fishing in Lake Superior. The hard work from rowing his boat made him sweat, so he jumped in the Lake to cool off. The salt from my Grandad's back spread throughout the Lake.

The last time you were in Toronto, did you drink a glass of water? If you did, salt ions from my Grandad were in the water you drank from Lake Ontario.

NOTES

1. Adapted from Presentation of Joanna D. Underwood, President, Inform, Inc. at a workshop entitled "Pollution Prevention/ Business Modernization Linkages," (Chicago, September 18, 1990).
2. The Conservation Foundation, *State of the Environment: An Assessment at Mid-Decade* (Washington, D.C., 1984), pp. 39-40; and Ross Hume Hall, "Why the EPA Won't Work," Probe Post (Spring 1987), p. 29.
3. M. L'Ecuyer et al., *Toxic Use Reduction: From Pollution Control to Pollution Prevention* (Boston, Mass: 1988), pp. 9-10.
4. Adapted from T. Clark, et al., "Wildlife monitoring, modeling, and fugacity," *Environmental Science and Technology* 22, no. 2 (1988): 120-127.

EXAMPLES OF BIOMAGNIFICATION RATES FROM WATER TO HERRING GULLS[4]

Hexachlorobenzene: *2.1 million to 18 million times higher in Gull than in water.*

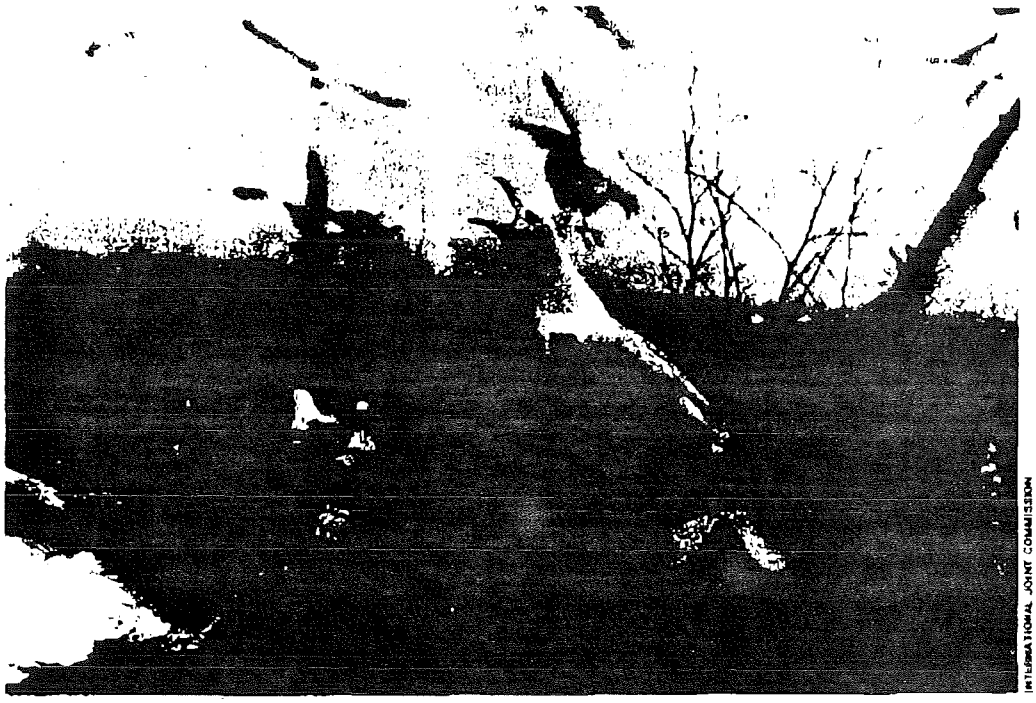
DDT: *half a million to one million times higher.*

DDE: *140 million to 300 million times higher.*

Dieldrin: *700,000 to 850,000 times higher.*

PCBs: *33 million to 333 million times higher.*

This is based on chemicals in water moving up the food chain through smelt and alewives, which are eaten by herring gulls.



INTERNATIONAL JOINT COMMISSION

PART II
THE ZERO DISCHARGE STRATEGY

CHAPTER 6
The Call for Zero Discharge

The Basis of the Zero Discharge Strategy

How far have we progressed toward the goal of restoring the quality of the environment?

The answer is in fact embarrassing. Apart from a few notable exceptions, environmental quality has improved only slightly, and in some cases has become worse.

These few successes explain the far more common failures. Each of these pollutants has been effectively controlled not by high-tech devices, but by simply stopping its production or use.

The lesson of both the few successes and the far more numerous failures is the same: environmental pollution is a nearly incurable disease: but it can be prevented.

-Barry Commoner[1]

A zero discharge strategy must be based on five fundamental principles:

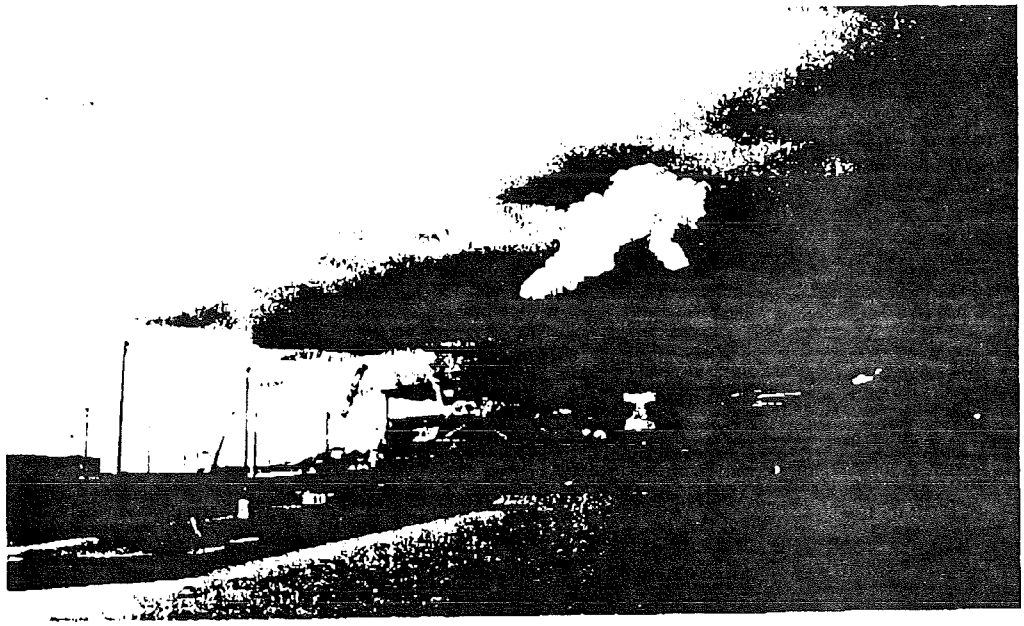
1. ***Eliminate the Use of Toxics:***
Instead of focussing on reducing and treating wastes, polluters must eliminate the use of toxics to avoid creating the wastes in the first place.

2. *Decrease Total Quantities of Toxics in the Environment:*
The ***total amounts*** of toxics entering the Great Lakes ecosystem must be substantially reduced according to a strict timetable.

3. *Address All Sources of Pollution:*
All sources of toxics must be controlled, including discharges from municipal sewage treatment plants and industries, and agricultural and urban run-off. These sources must be addressed regardless of whether the initial release of toxics is into water, air or on to land.

4. *Enforce the "No Right to Pollute" Principle:*
No one has the right to pollute. Permits that have been granted that allow pollution are only temporary concessions and must be phased out as quickly as possible.[2]

5. *Institute a Reverse Onus Requirement:*
The user or discharger of a possibly toxic substance must prove that the substance will not harm the environment. A chemical should be assumed to be harmful unless proven otherwise. The International Joint Commission called for this principle in its most recent report to the U.S. and Canada.[3]



MICHIGAN DEPARTMENT OF NATURAL RESOURCES

Government Commitments to Zero Discharge

Despite the significance of the Great Lakes and our collective rhetoric to restore and enhance them, we as a society continue to mortgage their future by poisoning, suffocating and otherwise threatening them because of insufficient knowledge, other priorities and short-sightedness.

—International Joint Commission, Fifth Biennial Report on Great Lakes Water Quality.

In 1972, the U.S. and Canadian Federal Governments signed the *Great Lakes Water Quality Agreement* in which they promised to work together to clean up and protect the Great Lakes. The Agreement, as revised in 1978, is based on two guiding principles: an ecosystem approach and zero discharge of persistent toxic substances.

The U.S. and Canadian Governments promised to "eliminate or reduce to the maximum extent practicable the discharge of pollutants into the Great Lakes System." They made an even more stringent commitment regarding the discharge of persistent toxic substances. The discharge of all persistent toxic substances is to be "virtually eliminated."

In order to achieve this goal, the Agreement states that all present and future discharges must be stopped. According to Annex 12, "The philosophy adopted for control of inputs of persistent toxic substances *shall be zero discharge*." Actions that are inconsistent with the zero discharge strategy are described in the Agreement as "interim."

The two Federal Governments realized that the key to achieving the Agreement's goal of restoring ecosystem health is applying a zero discharge strategy to all sources of toxics. The Agreement requires controls of industrial and municipal "point" sources of contamination as well as "non-point" sources such as poison runoff from urban and agricultural land, contaminated sediments, airborne toxic substances, and pollution from contaminated groundwaters.[4]

Governments in the Great Lakes Basin have made similar commitments in several other pieces of legislation or agreements. Section 101 of the U.S. *Clean Water Act* of 1972 states that "it is the national goal that the discharge of pollutants into navigable waters be eliminated by 1985." Section 118 of this Act directs the U.S. to "seek to attain the goals embodied in the *Great Lakes Water Quality Agreement* of 1978 . . . with particular emphasis on goals related to toxic pollutants."

In the 1986 *Great Lakes Toxic Substances Control Agreement*, the eight Great Lakes States and the Provinces of Ontario and Quebec promise to act consistently with the *Great Lakes Water Quality Agreement*. Principle IV states:

> The signatory States commit to continue reducing toxics in the Great Lakes Basin to the maximum extent possible. Such actions shall be consistent with the *Federal Clean Water Act* goal of prohibiting the discharge of toxic pollutants in toxic amounts, as well as the *Great Lakes Water Quality Agreement's* aim to "virtually eliminate" the discharge of all persistent toxic substances.

Ontario's Municipal-Industrial Strategy for Abatement (MISA) and its Clean Air Program (CAP) both state as their aims the virtual elimination of persistent toxic substances.

Despite these many promises of zero discharge, the Governments in the Great Lakes Basin have failed to develop and implement a zero discharge strategy.

In its 1990 report to the Canadian and U.S. Federal Governments, the International Joint Commission concluded its assessment of government progress by saying:

> The Agreement's zero discharge philosophy must become a reality as soon as technologically possible. While the Parties' strategy to regulate producers is required to ensure action by the primary sources of persistent toxic substances, it will not be a sufficient plan to achieve zero discharge. A much more comprehensive and systematic strategy is required.[5]

Substances to Which the Zero Discharge Goal Applies

In the *Great Lakes Water Quality Agreement*, the zero discharge philosophy applies to persistent toxic substances. The Agreement defines persistence as a half-life in water greater than eight weeks. Attention is focussed on persistent toxic substances because this class includes those chemicals that biomagnify in living organisms where they can cause serious health impacts.

However, non-persistent toxics should not be excluded from the zero discharge strategy. Some chemicals that are not persistent or that do not biomagnify at high rates can, nevertheless, have serious health effects. Benzene, for example, does not biomagnify; it does, however, cause cancer. The U.S. *Clean Water Act*'s zero discharge goal applies to all discharges, regardless of whether they persist or biomagnify.

The zero discharge strategy outlined in this report places top priority on persistent toxic substances. But, the same basic principles should be extended to all toxic substances.

ng Definitions o Discharge

"Zero discharge" is sometimes defined in ways that limit its implications. To implement a zero discharge strategy it is first necessary to understand what it does, and does not mean.

"Zero discharge" is not the same as "virtual elimination":

Some people who wish to weaken zero discharge programs argue that we cannot totally eliminate discharges of toxics; the best we can do, they say, is to almost or virtually eliminate them. These people sometimes use the *Great Lakes Water Quality Agreement* to defend their position. This argument misinterprets the zero discharge objective.

The Agreement recognizes that it is impossible to totally eliminate persistent toxic substances from the Great Lakes ecosystem because we cannot completely clean up or recapture those contaminants already released. Also, some toxics occur naturally. Therefore, we can only virtually eliminate the presence of persistent toxic substances in the Great Lakes Basin.

The objective of the zero discharge strategy outlined in this report is to virtually eliminate the presence of toxics in the Great Lakes ecosystem. Because of the large amounts of these substances already in the Great Lakes, virtual elimination can only be achieved by preventing any additional discharge of these substances (i.e., by implementing a zero discharge strategy), and by cleaning up to the maximum extent possible those contaminants we have already released.

"Zero discharge" does not mean reducing discharges to a level where no impacts can be demonstrated:

There is not enough information to predict all impacts of toxics on the Great Lakes ecosystem. Nor do we have the ability to measure adequately all impacts when they do occur. Most effects from persistent toxic substances do not show up for many years. An extremely hazardous substance could be discharged for decades before its effects on wildlife and human health are apparent.

"Zero discharge" does not mean lower levels than can be measured with current monitoring techniques:

Many pollutants cause harm by accumulating in the environment—including in fish, wildlife and people—over time. Dangerous levels of these toxics can accumulate even though their concentrations are so diluted that they cannot be measured *in water* with current monitoring techniques. Interpreting "zero discharge" to mean "zero measured" or "non-detectable" in water could allow continued dumping of toxics that bioaccumulate to dangerous levels.

For this reason, the *Great Lakes Water Quality Agreement* defines the "absence" of persistent toxic chemicals to mean that they are not found in biological indicators such as fish, wildlife or people. A true zero discharge strategy prevents the use and generation of dangerous toxic chemicals, and makes irrelevant the argument that discharge levels that cannot be detected satisfy the zero discharge mandate. If use of a toxic chemical is prevented, it can not be discharged or become available to biomagnify.

"Zero discharge" does not mean best available technology to reduce toxic discharges:

It is not sufficient to control discharges of persistent toxic chemicals only to the extent that some treatment technology currently exists. Changes in processes and products to

A Citizen's Definition of Zero Discharge

For us "zero" means zero. Pollution must be prevented before it is generated. Production processes (including agriculture) must be reformulated so that these toxic substances are not used, produced or discharged. "Zero" does not mean reducing discharges beneath some arbitrary level or even beneath the level of detection. Zero means none.

The use of the term "discharge" is not limited to a single environmental medium. It applies to toxic discharges into water, air, landfill, product, etc. Nor can persistent toxics be eliminated by shifting them from one medium to another or by attempting to recycle them after they have been produced.

—Statement of Principles by the Zero Discharge Alliance, a grassroots network of concerned activists throughout the Great Lakes Basin.

avoid the use of toxics are the preferred methods. We may not be able to achieve zero discharge overnight, but, unless there are measures to force new and innovative clean technologies, polluters will continue to go about business as usual.

Achieving Zero Discharge

A zero discharge strategy means making society less dependent on the *use* of toxic chemicals. "Zero discharge" means maximum use of all of the following techniques:

- Replacing toxic products or activities with non-toxic products and methods; for example, using environmentally benign pest control methods instead of chemical pesticides, and using chemicals other than chloroflorocarbons for coolants;
- Using raw materials in production processes that are less hazardous; for example, replacing lead or mercury in paint with less toxic constituents, and substituting water-based inks for solvent-based ones;
- Redesigning products so they don't require the use of hazardous materials in their production; for example, using unbleached paper so that chlorine does not have to be used in pulp and paper mills;
- Changing production processes; for example, replacing organic solvents for cleaning machinery with mechanical processes;
- Reusing toxic raw materials instead of throwing them away; for example, recycling and reusing inks in a printing shop; and
- Instituting better operating practices; for example, using more efficient equipment, preventive maintenance, employee training or good housekeeping to ensure optimal process conditions and minimal leakage.

Pollution Prevention and Toxic Use Reduction

"Pollution prevention" means avoiding the generation of toxic pollutants by reducing their use, rather than capturing pollutants at the end-of-the pipe. Pollution prevention programs require an examination of why the chemicals are being used or generated. Because of this focus on the *use* of toxic chemicals, the term "toxics use reduction" is preferred.

When referring to "pollution prevention," the emphasis must always be prevention of the use and generation of pollutants. Hence, the term does not mean efforts to treat or recycle wastes.

Steps in a Zero Discharge Strategy

The zero discharge strategy for the Great Lakes includes the following steps:

Step 1: Prohibit new or increased discharges of toxics into the Great Lakes ecosystem.
Step 2: Ban the use of the most harmful persistent toxic substances.
Step 3: Eliminate and reduce the use, generation and disposal of all toxic chemicals through the enactment of model toxics use reduction provisions in each Great Lakes jurisdiction.

Each of these steps is described in detail in the next three chapters of this report.

NOTES

1. B. Commoner, "Failure of the Environmental Effort," *Environmental Law Reporter* 18 (1988): p. 10195.
2. "In declaring that '[t]he use of any river, lake, stream or ocean as a waste treatment system is unacceptable', Congress made a basic legislative finding that any pollutant discharge into national waters was simply too much. The 1972 Amendments expressly negate any claim of right to pollute the nation's waters." Van Putten and Jackson, "The Dilution of the Clean Water Act," *Journal of Law Reform* 19 (1986): p. 868-869.
3. *Fifth Biennial Report on Great Lakes Water Quality*, Part II, (1990) p. 21.
4. For information on the Agreement, request a copy of "*A Citizens' Guide to the Great Lakes Water Quality Agreement*," from Great Lakes United, Cassety Hall, 1300 Elmwood Avenue, Buffalo, New York, 14222, (716) 886-0142.
To receive a copy of the Agreement, contact the International Joint Commission, 100 Ouellette Avenue, Windsor, Ontario, N9A, 6T3, (519) 256-7821.
5. Op. cit. p. 17.

Chemicals with known bioconcentration factors greater than 250 should immediately be sunset without waiting for this task force's work to be carried out. The task force should, however, include in its work an assessment of whether the bioconcentration factor should be set at a lower cutoff point and of the methods for calculating bioconcentration factors.

The public should be included in all aspects of this task force's work.

RECOMMENDATION: The U.S and Canadian Federal Governments should set up a joint sunset task force. The public should be consulted in all aspects of this task force's work. The task force should submit its recommendations to the U.S. and Canadian Governments by the September, 1993, biennial meeting of the IJC.

The Sunrise

No new chemicals should be allowed to be produced or used unless they have gone through a screening process in which the chemicals are demonstrated not to bioaccumulate or threaten the health of fish, wildlife or people. This screening process is sometimes referred to as the "sunrise" process. The sunrise process should be based on the same criteria that are used in deciding to sunset existing chemicals.

The person wishing to use or produce a new chemical should have the burden for proving that the sunrise criteria are met. The public and government agencies should not be required to prove that the chemical will cause harm.

RECOMMENDATION: The U.S. and Canadian Federal Governments should use the criteria for banning chemicals developed by the sunset task force to screen the use or production of new chemicals in the Great Lakes Basin.

The Sunset Timetable

For toxic chemicals with high bioaccumulation potential, that pose serious danger to the environment, or for which an alternative is readily available, an immediate ban should be implemented.

In other cases, a specific timetable for the phase-out should be set. This will force industry to develop low-risk alternatives and technologies. Quantifiable interim reduction targets should be set and annual reports should be required to prove progress in achieving the phase-out. Phase-out requirements should be put into individual permits for the use or discharge of chemicals being phased out.

RECOMMENDATION: The two Federal Governments should set specific timetables for phasing out of all chemicals not subject to an immediate ban. These timetables should be set by September of 1994, one year after the task force's recommendations are issued.

Legal Authority to Sunset Chemicals

Legal authority to ban and phase out chemicals currently exists in Canada and the United States.

The Canadian Federal Government has the power to sunset a chemical under the *Canadian Environmental Protection Act*. So far, this act has been used to control only a half dozen substances.[2]

The Province of Ontario could also sunset chemicals. This would repeat the regulatory route it used to phase-out the use of CFCs in certain products.

The U.S.'s *Toxic Substances Control Act* authorizes the banning of substances and products if "there is a reasonable basis to conclude" that a certain chemical may present "an unreasonable risk of injury to health or the environment." This legislation has been used to control PCBs and asbestos.

A Role for the International Joint Commission

The IJC should play an important role as a catalyst and coordinator in the development and implementation of a sunset/sunrise process.

RECOMMENDATION: The Canadian and U.S. Governments should issue a sunset reference to the International Joint Commission. This reference should be announced by the September 1991 meeting of the IJC.

The IJC should be asked to:

1) Assist in the development of sunset list criteria, by:
   - developing bioconcentration factor methodology common to all jurisdictions in the basin;
   - assisting in determining hazardous properties that lead to sunsetting;
   - identifying alternatives to chemicals or processes.
2) Establish a data bank on sunsetting information in all jurisdictions, including a catalogue and report on the chemicals that have been sunset in other jurisdictions.

A Global Sunset

Sunsetting toxic chemicals in the Great Lakes Basin will not absolutely prevent these chemicals from contaminating the Lakes. As long as they are used in other parts of the world, they may be deposited in the Lakes as toxic air pollution.

The Great Lakes are particularly vulnerable to pollution from distant sources. Contaminants carried through the air from thousands of miles away are deposited on the large surface areas of the Great Lakes. For example, the International Joint Commission estimates that 90 percent of the PCBs in Lake Superior come from the air. Over half of the PCBs in Lakes Michigan and Huron are estimated to come from the air.

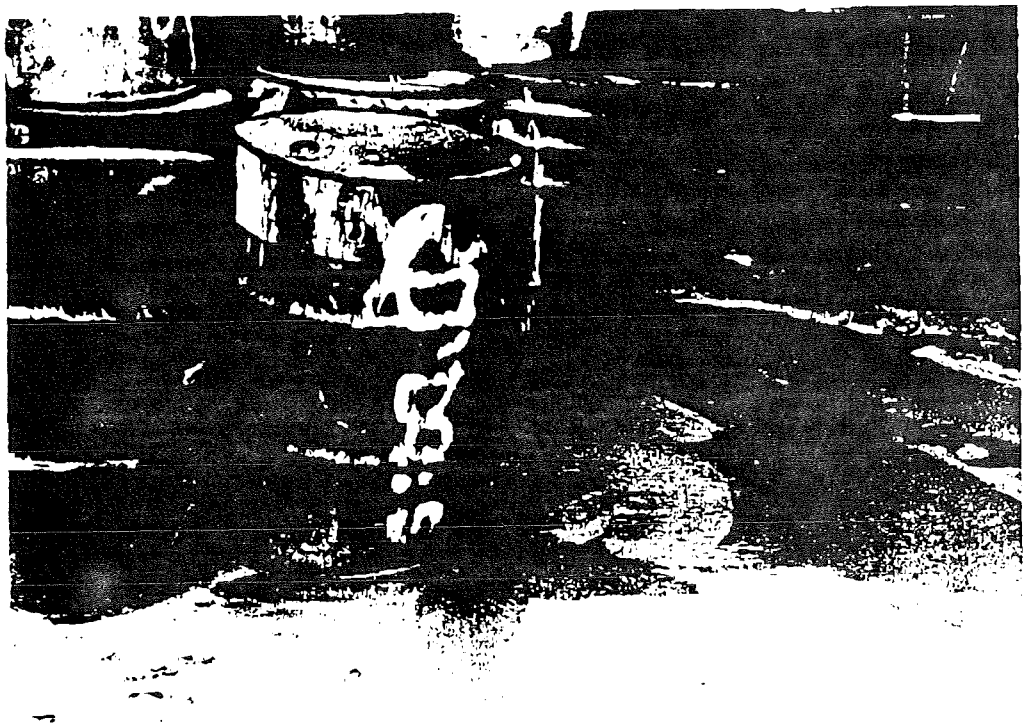
The Organization for Economic Cooperation and Development is now examining the sunsetting concept.[3] The Canadian and U.S. Governments should become part of international efforts to sunset chemicals on a global scale and should set as a priority toxic chemicals contaminating the Great Lakes from long-range atmospheric deposition. Action in banning chemicals within the Great Lakes Basin should not, however, wait for the successful negotiation of international sunsetting agreements.

NOTES

1. "Environmental Quality: Twentieth Annual Report," *The U.S. Council on Environmental Quality*, Executive Office of the President, (1990) p. 363.

2. The chemicals regulated under the Act include: PCBs, mirex, polybrominated biphenyls (PBBs), polychlorinated terphenyls (PCTs), and chloroflorocarbons (CFCs). A number of industrial sectors are regulated under the air pollution provisions under Part II of the Act.

3. In late 1989, the Swedish delegation made a proposal for the development of a sunset chemical list at the 13th joint meeting of the OECD Chemicals Group in Paris, France. The basics of the proposal is outlined in Bo Wahlstrom, "Sunset for Dangerous Chemicals," *Nature* 341, (28 September, 1989): p. 276.



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