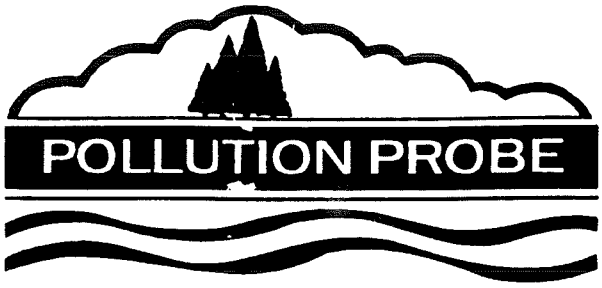

SUNSETTING CHEMICALS

Pollution Probe Information Packages

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ARTICLES

The Sunset Chemicals Proposal

JEFFERY A. FORAN

ABSTRACT. *A proposal for international management of hazardous chemicals has been developed by Sweden. The Sunset Chemicals proposal, which calls for uniform international procedures to phase out or ban particularly hazardous chemicals, has been considered within the OECD. Adoption by OECD member countries of uniform risk management procedures, which include—but are not necessarily limited to—"sunset chemicals," is particularly important since member countries produce 70 percent of the world's gross domestic product, conduct 70 percent of the world's trade, and produce most of the world's chemicals. The OECD has been successful in developing uniform assessment procedures for new and existing industrial chemicals, but uniform risk management protocols have yet to be adopted. However, the first steps in international chemical risk management were taken by OECD member countries at the May 1990 joint meeting held in Paris.*

Introduction

The Organization for Economic Cooperation and Development was developed with three basic objectives: achieve the highest sustainable economic growth and employment and a rising standard of living in member countries; contribute to sound economic expansion in member and non-member countries; and contribute to the expansion of world trade on a multilateral, non-discriminatory basis. As part of the pursuit of these objectives, OECD member countries have also developed policies, legislation, and institutions to maintain and improve the environment. Development of environmental protection policies in OECD countries is particularly important since member countries produce 70 percent of the world's gross domestic product, conduct 70 percent of the world's trade, and account for most of the world production of chemicals.[1]

The OECD now recognizes, as a fourth objective, the importance of coordinated action to preserve and protect environmental quality in member as

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well as non-member countries. The OECD has called for the promotion of environmentally conscious energy production, non-polluting technologies, recycling of materials, and environmental impact assessment in advance of major projects. Further, the OECD has emphasized the need for governments to anticipate problems by considering, at an early stage, the environmental consequences of economic and social policy decisions. Finally, OECD has stressed the importance of strengthened international cooperation, particularly with regard to the management of natural resources, reduction of air pollution, control of the movement of hazardous wastes, and control of chemicals.

Background

The Environment Committee of the OECD Environment Program was established to enhance cooperation among member countries in promoting environmental quality. In 1971, The committee recommended the creation of a chemicals program that was to examine the possibilities of, and foster international cooperation in, the management of pesticides and industrial chemicals. Initially, the Chemicals Group (as it became known) concentrated on a few specific chemicals of particular concern because of their persistence and biological activity: PCBs, mercury, cadmium, and chlorofluorocarbons (CFCs).[2] However, OECD recognized that paying attention to a few specific chemicals would not adequately protect humans and the environment. Nor could attention to a few specific chemicals enhance member countries' coordination of policies to assess and regulate chemicals before manufacture or marketing.[1]

OECD has examined potential distortions in international trade resulting from differences in national chemicals policy. It has also tried to determine where national efforts to assess hazards associated with chemicals may be unnecessarily duplicative. Therefore, the work of the Chemicals Group shifted from reactive actions on specific chemicals to developing anticipatory programs to assess in a coordinated fashion the potential hazards of existing and new industrial chemicals to human health and the environment.

Beginning in the late 1970s, the Chemicals Group merged with a special management committee to further the OECD's efforts in international control of hazardous chemicals. This newly named Chemicals Group and Management Committee worked toward:

- harmonizing test methods and data requirements for industrial chemicals among member countries;
- development of internationally acceptable principles for good laboratory practice;
- development of a minimum pre-marketing set of data for new chemicals;
- mutual acceptance of data among member countries;

- systematic investigation of existing chemicals through development of a screening information data set (SIDS); and
- development of information exchange related to export of hazardous chemicals.[1]

Chemicals risk management activities, which centered on information exchange on administrative and legislative measures for chemicals control, also began in this period. However, new initiatives in chemicals control for the long term did not begin until the thirteenth joint meeting of the Chemicals Group and Management Committee in November 1989, in Paris. OECD member countries recognized at this meeting that management and restriction of chemicals needed immediate consideration. Further, the Chemicals Group and Management Committee recognized that some control criteria were emerging from decisions on new chemicals notifications in member countries and that the work on existing chemicals could lead to considerations for restricting some existing, high-production-volume chemicals.

The Sunset Proposal: Phase-out or Ban of Hazardous Chemicals

An innovative outcome of the thirteenth joint meeting was a proposal developed by the Swedish delegation that called for aggressive measures to manage cooperatively, through phase-out or ban, chemicals identified as the most hazardous to humans and the environment. These measures would apply to substances termed Sunset Chemicals.[3]

The Sunset process would begin with development of criteria to identify chemicals that are not compatible with sustained development. Criteria would include consideration of hazard associated with carcinogenicity, mutagenicity, teratogenicity, and other human health effects; persistence; ubiquitous presence in the environment; and environmental hazard. Expert committees of representatives from member countries would develop the criteria. Hazardous chemicals that should be partially or totally phased out would then be identified according to the criteria. This list of Sunset Chemicals would then be circulated to industries to allow proposals about deletions, omissions, and additions to the list. Industries could also argue why specific chemicals should not be candidates for the list. Industries would then be required to develop a plan for phase-out or "sunset" of the chemicals. The plan would be developed cooperatively with all OECD member countries where the chemical is produced, stored, or used. The sunset plan would have to include a quantitative component—for example, a 50-percent reduction in use or discharge must occur in five years in member countries. The process would ultimately require a ban ("sunset") on the identified chemicals.[3]

The goal of a sunset proposal is to eliminate exposure to humans and the environment of the most hazardous chemicals. Where a change in industrial

process results in the reduction or elimination of environmental or human exposure, a ban on the use of the chemical may not be immediately necessary. It is important that this process allows sufficient time to develop alternate technologies or alternate, safer substitute chemicals prior to a ban. However, the Sunset process does include a ban as a forcing mechanism to develop safer substitutes and to eliminate environmental and human exposure.

Discussion

A systematic management protocol that is adopted and coordinated internationally will enhance efforts to control the impacts of hazardous substances on humans and the environment. The Sunset process was initiated because of the recognition that work on existing hazardous chemicals focused on one issue at a time, thus hampering efficient management activities. Case-by-case management is much less efficient than comprehensive, systematic management when addressing very large numbers of hazardous chemicals. Further, as new data on chemicals produced or used internationally become available through the Minimum Pre-marketing Data and SIDS processes, even more chemicals may require management activities, including phase-out or ban.

A sunset approach that includes criteria and requirements for phase-outs and bans of hazardous chemicals may be relatively restrictive. That is, it may not allow a graded approach to risk management where the hazard of individual chemicals lies on a continuum and where only those chemicals that pose "substantial" risk to human health or the environment may require a ban. Risk management activities providing alternatives to a complete ban include changes in use patterns and changes in process technologies to limit releases to the environment. Both activities may be successful in reducing and ultimately eliminating exposure—the primary goal of any risk management activity—short of requiring a complete ban on the chemical.

Criteria development is a crucial element for a sunset procedure. Either relatively specific criteria that identify chemicals to be phased out or banned, or criteria that place chemicals along a continuum to allow a graded approach to risk management are necessary. Sunset criteria also allow chemical producers, manufacturers, and users to anticipate whether a *new* chemical will likely qualify for a sunset list prior to manufacture or marketing ("birth control"). In this case, Sunset criteria developed and used by OECD member countries for new chemicals can be coordinated with data collected under existing programs such as the Minimum Pre-marketing Database (MPD). MPD data can then be evaluated via sunset criteria to guide countries or industries in making uniform decisions about development or marketing of new chemicals.

The criteria development process can be conducted in two ways. Development can be based on decisions that have driven past management activities, where countries have agreed to ban or restrict the use of a chemical (for ex-

ample, CFCs). Unfortunately, relatively few such activities have occurred. Alternately, criteria can be based on parameters that would guide countries and industries in identifying the hazardous chemicals to be banned or to be placed on the risk management continuum. Ultimately, a combination of the two approaches will likely produce effective criteria that can be adopted and applied uniformly in OECD member countries. However, any process to develop criteria must incorporate all segments of society—including government, industry, and the public—since risk management decisions will ultimately affect everyone within and outside member countries.

Phase-out and ban of hazardous chemicals are not unprecedented activities, although international cooperation on phase-outs and bans is unusual. International activities on CFCs have evolved through recognition of their global environmental impacts. Relatively few other examples of this level of international cooperation exist. At least two environmental statutes in the United States allow bans or require use or production phase-outs. Hazardous pesticides (for example, DDT, dieldrin) have been banned in the United States under the Federal Insecticide, Fungicide and Rodenticide Act, while new and existing industrial chemicals can be banned or phased out under the Toxic Substances Control Act.

Legislation that does not directly ban or phase out specific chemicals could, nevertheless, draw upon a sunset process. The U.S. Clean Water Act requires the elimination of point source discharges of toxic pollutants to surface waters. Two approaches, technology-based and water quality-based treatment controls,[4] have been used to try to meet this requirement. However, these approaches, which are applied at the point where the effluent meets the receiving stream, have failed to eliminate all discharges of toxic pollutants to surface waters. A sunset process that requires source control, through a ban or phase-out of hazardous chemicals, would obviate reliance on treatment technology to remove hazardous compounds at the point of discharge. The U.S.-Canadian Great Lakes Water Quality Agreement also calls for the virtual elimination of the discharge of persistent toxic pollutants to the Great Lakes. A sunset process for hazardous chemicals could be used under the agreement to organize the virtual elimination of the most hazardous pollutants or processes.

Conclusions

At the fourteenth joint meeting of the OECD Chemicals Group and Management Committee, held in May this year in Paris, member countries discussed adoption of the Sunset proposal and alternatives. Several member countries opposed the Sunset concept, yet confirmed the need for uniform risk management strategies.[5] However, some countries agreed to begin examining a few chemicals that have been deemed particularly hazardous and that may be appropriate for risk or exposure-reduction activities. The chemicals include

lead, methylene chloride, cadmium, mercury, and brominated flame retardants. Risk- and exposure-reduction activities will include evaluation of existing uses, sources of the materials, their fate and environmental transport, as well as chemical management regulatory and economic activities underway in OECD member countries. Evaluation of potential management activities will focus on development and availability of substitute chemicals (a "sunrise" process) and the economic and environmental advantages and disadvantages of potential substitutes.

International cooperation in the management of hazardous chemicals is necessary since production and trade in chemicals are internationally organized. If restrictive measures in one country could be evaded in others, unfair competitive advantages among countries would result. Cooperation is further necessary since chemicals released into the environment do not recognize national boundaries.

Any comprehensive, uniform risk management strategy adopted by OECD member countries should include efforts to exchange information on existing risk management activities. Those might include how risk management decisions are presently made and how they are implemented. Further, risk management strategies adopted by the OECD should allow some flexibility in implementing different management options that result in the same outcome (for example, elimination of exposure) in member countries. These concepts have been discussed by the United States and other OECD member countries.[5] Flexibility would provide opportunities to eliminate exposure while minimizing economic and social impacts and while maximizing the use of national legislation to implement risk management activities. However, international agreement on elimination of exposure may require agreement, at least philosophically, on the use of forcing mechanisms such as quantitative requirements for use, or emission reductions and, ultimately, bans on some compounds.

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22 Years Protecting the Environment

POLLUTION PROBE

22 ans de protection de l'environnement

Developing a Sunset Chemical Protocol for the Great Lakes Basin: Its Basis, Scope and Implementation

A Paper Prepared for
the Global Pollution Prevention Conference
held at Washington, D.C.
on April 3-5, 1991

by

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1. Introduction

> "It appears that the only chemicals to have declined significantly in the Great Lakes ecosystem are those whose production and use have been prohibited outright or severely restricted."
>
> - U.S. Council on Environmental Quality[1]

The concerns posed by toxic chemicals remain as high on the public's agenda as they did over a decade ago. While the debate may persist as to exactly how successful or unsuccessful current pollution control efforts are, they are simply not good enough. New approaches, such as pollution prevention, are needed.

This paper examines one component of a pollution prevention approach. Known as a "Sunset Chemical Protocol", this component focuses on developing a process to eliminate the most dangerous toxic substances by phasing-out their use and generation, leading to an eventual ban.* The key difference between the sunset chemical process and existing mechanisms is in its focus. The process is designed to comprehensively and systematically deal with the question: "Which chemicals should be eliminated and how should that objective be accomplished?" The Sunset Chemical Protocol is not intended to supplant other regulatory efforts; instead, it is designed to supplement them and accelerate action

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* The scope and components of a policy framework to sunset chemicals are subject to debate. Pollution Probe in conjunction with the George Washington University have drawn on this debate by developing such a framework, which we call a Sunset Chemicals Protocol.

on those chemicals, processes and products causing the most harm.

It has been proposed elsewhere that the Great Lakes would make an ideal demonstration project for the development of a Sunset Chemical Protocol.[2] As such, reference will be made in this paper to the Great Lakes to add some grounding to the examination. The next section, then, develops the rationale for a sunset process in the Great Lakes basin. The following section examines in more detail the basis and substance of the sunset chemical concept. The final section examines implementation issues pertinent to the sunset chemical approach.

2. The Need for a Sunset Chemical Protocol in the Great Lakes Basin

> "Take the Great Lakes: what more needs to be done? Well, first, the nation needs to confront the single largest failure of our water quality improvement efforts - a problem as familiar in 1969 as it is in 1989."
>
> - U.S. EPA Administrator William Reilly[3]

There are a number of arguments for a pollution prevention approach in the Great Lakes basin. This section explores four of such arguments which illustrate the need for programs to eliminate the worst chemicals through a sunset approach.

2.1. Continued Ecological and Human Health Impacts

Traditionally, the environmental and human health concerns in the Great Lakes focused on the most blatant and acute effects arising from toxic chemicals. However, in recent years, a wealth

of evidence has been collected which suggests that the impacts of these chemicals are much more insidious than previously thought. Impacts are found to be longer term, having a wide and varied range.

Perhaps the most comprehensive and authoritative summary of ecological impacts was provided by the Conservation Foundation and the Institute for Research on Public Policy in their 1990 book, Great Lakes, Great Legacy?. The book identified that the impacts on Great Lakes fish and wildlife were not limited to acute health effects and cancer.[4] Instead, the range of effects included population declines, reproductive effects, eggshell thinning, "wasting", gross defects, tumours, immune suppressions, generational effects and behaviourial changes for many Great Lakes species.

While fish and wildlife can be regarded as indicators of ecosystem health, there are other indicators of a stressed Great Lakes. Perhaps the most dramatic is the link between toxic chemicals and human health problems. One of the few areas of consensus on this issue is that more needs to be known about the impact of toxic chemicals on people living in the Great Lakes ecosystem.[5]

Already however, a series of studies completed in 1985 illuminate such linkages. The studies found that children born to women who had a steady diet of Lake Michigan fish had smaller heads, weaker reflex responses and scored lower on visual memory and verbal skill tests. When the same children were tested four

years later, some of the deficiencies and impairments were still present.[6]

In April of 1990, the International Joint Commission (a binational body which oversees and reports on Great Lakes matters to the U.S. and Canadian governments) concluded that human health was at risk in the Great Lakes ecosystem. The Commission stated that:

> "When available data on fish, birds, reptiles and small mammals are considered along with this human research, the Commission must conclude that there is a threat to the health of our children emanating from our exposure to persistent toxic substances, even at very low ambient levels."[7]

2.2. Costs of Clean-up

Attempting to control persistent toxins is an expensive undertaking, costing industries billions of dollars in control equipment and operation and maintenance expenses. Since control equipment cannot eliminate or even seriously reduce persistent chemicals, the pollution control approach is economically very inefficient.[8]

Furthermore, cleaning up the Great Lakes is proving to be a very expensive undertaking. There are 43 officially recognized "Areas of Concern" or toxic hotspots around the Lakes. Remedial Action Plans (RAPs) are being developed for each of these areas. The Washington, D.C.-based Northeast-Midwest Institute estimates that a partial clean-up of only ten toxic hotspots will cost between 2.9 billion and 3.4 billion dollars.[9] Similarly,

Canadian scientists estimate that it will cost $6 billion over the next thirty years and $19 billion over the next one hundred years to contain, monitor and clean up four of the largest leaking dumps on the U.S. side of the Niagara River.[10]

Only rarely are such clean-up costs included in the costs of production. Once these externalities are taken into account, the incentives for preventative strategies are greatly enhanced.

2.3. Failure of the End-of-the-Pipe Focus

Current regulatory methods focus on trying to determine acceptable levels of discharges by using an "end-of-the-pipe" approach, rather than preventing the use or generation of the pollutants in the first place. The end-of-the-pipe regulatory focus has a number of implications for the Great Lakes. First, on a basin-wide level, a large volume of chemicals continue to be released into the Great Lakes. In 1988, for example, over 1.7 billion pounds of 320 toxic substances were released by the U.S. Great Lakes states alone (see Table 1).[11] This amounts to about 4.5 million pounds every day. Canadian toxic pollution cannot even be estimated since comprehensive data on toxic releases are not gathered.

Table 1. Chemical Waste Releases and Transfers in the Eight Great Lakes States (in millions of pounds*/1988).[12]

State	# of Generators	Total
Illinois	1229	250
Indiana	756	276
Michigan	790	233
Ohio	1360	375
Pennsylvania	1030	201
New York	816	176
Minnesota	330	65
Wisconsin	664	105
TOTAL	6975	1681

Second, an end-of-the-pipe approach focuses on assessing each individual source of pollution in isolation, rather than determining the combined impacts of a given pollutant discharged into all parts of the environment from all sources. Toxic substances enter the Great Lakes from leaking landfills, contaminated sediments and fallout from the air. As a result, total discharges of a pollutant into the environment may increase, even though an individual discharge is curtailed.

Finally, the traditional pollution control approach assumes that discharge reduction of some toxic chemicals will produce significant improvements in environmental health. However, this is not always the case. For example, since imposing controls,

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* The statistics shown include only plants which manufacture at least 50,000 pounds per year or use at least 10,000 pounds per year of one or more of the 320 chemicals for which releases have to be reported. The data include wastes released on site and transferred to publicly-owned sewage treatment plants or other off-site facilities. Pesticides are excluded from the data base.

lead concentrations in Lake Superior sediments still average around 140 parts per million (ppm), after reaching a maximum 160 ppm in the 1970s.[13] Similarly, concentrations of Benzo(a)pyrene in Lake Superior sediments decreased from 3.5 ppm in 1960's to approximately 0.5 ppm, and polychlorinated dibenzodioxins and furans in Lake Huron sediments decreased slightly from 3.2 parts per billion (ppb) in 1960 to 3.1 ppb in 1980.[14]

These data show that while traditional pollution control approaches can stabilize, or even somewhat decrease, inputs of persistent toxics, these chemicals are still present at high levels in the environment.

2.4. The Promise of Phase-outs and Bans

In early 1991, the Canadian government released a 750 page report on the effects of toxic chemicals in the Great Lakes.[15] The report concluded that levels of certain chemicals in Great Lakes fish and aquatic birds had decreased significantly over the last twenty years. The use of each of these chemicals was either severely restricted or banned.

Furthermore, some of the few examples of dramatic reductions in pollutant levels have occurred where chemicals have been banned or phased-out. Table 2 lists some of these examples for the U.S. as a whole.

Table 2. Improvements* in U.S. Pollution Levels.[16]

Pollutant	Time Period	Percent Change	Control Measure
lead emissions	1975-1985	-86%	removed from gasoline
DDT (in body fat)	1970-1983	-79%	agricultural use banned
PCBs (in body fat)	1970-1980	-75%	production banned
mercury (in sediments)	1970-1979	-80%	replaced in chlorine production

2.5. Obligations Under the Great Lakes Water Quality Agreement

A final justification for a Sunset Chemical Protocol is the commitments made by the federal governments Canada and the United States under the Great Lakes Water Quality Agreement. First signed in 1972, the Great Lakes Water Quality Agreement was re-negotiated in 1978 and amended in 1987. The Agreement contains an array of steps necessary to protect the Great Lakes ecosystem. Most importantly, Annex 12 of the amended Agreement states that "The philosophy adopted for control of inputs of persistent toxic substances shall be zero discharge".[17] The traditional pollution control approach cannot achieve zero discharge for most

* Lead is measured in amount emitted per year, while DDT and PCBs are measured as concentrations. The PCB values refer to a change in percentage of people with PCB body fat levels greater than 3 ppm.

persistent toxic substances. In other words, both governments have agreed to design regulatory strategies to prevent or eliminate the use and generation of persistent toxic substances.

3. The Development of a Sunset Protocol: A Proposal for the Great Lakes

> "...let us turn to the impact on EPA of the taboo against social intervention in the production system. The major consequence of this taboo is the failure to reach the goals in environmental quality that motivated the environmental legislation of the 1970's."
>
> - Barry Commoner[18]

This section will examine the basis and content of the Sunset Chemical Protocol, as well as some of the challenges it must face during implementation. The Sunset Protocol is defined as a systematic and comprehensive process for phasing-out and banning chemicals, processes and products that cause the worst harm. The Protocol is based on scientific and environmental data.

3.1. Background to the Concept in the Great Lakes

The concept of sunsetting chemicals has surfaced in discussions about Great Lakes water quality and has gained some constituency.[19] In February of 1991, the Canadian Institute for Environmental Law and Policy and the U.S. National Wildlife Federation released a three year research report which outlines a strategy to achieve the goal of zero discharge. The report, A

Prescription for Healthy Great Lakes, outlines a number of components of the strategy.[20] One of its primary components pertains to the immediate phase-out of some 70 substances because of their persistence and their ability to bioaccumulate in the environment. Along with the immediate phase-out, the report recommends a process to develop criteria for the further identification and phase-out of other dangerous chemicals.

In April 1991, the Virtual Elimination Task Force, a working group established by the International Joint Commission, released its summary report on zero discharge, which discusses and recommends the concept of sunset chemicals.[21] Finally, the U.S. Senate is currently examining sunset sections under the Federal Water Pollution Control Act. For example, under a bill introduced by Senators Baucus and Chafee, the discharge of eight chemicals, including 2,3,7,8 TCDD, mercury and toxaphene, would be prohibited.[22] The bill proposes that additional substances be subject to discharge prohibitions if they prove toxic and highly bioaccumulative.

3.2. Elements of the Concept

A Sunset Chemical Protocol for the Great Lakes would consist of four primary elements, including the development of criteria, the establishment of a sunset list, the implementation of the Protocol, and a mechanism for "Sunrise" chemicals.

3.2.1. Criteria Development

The first element a Sunset Chemical Protocol is the development of a set of criteria to be used for identifying target chemicals.* Such criteria would include:

- o hazard associated with carcinogenicity, mutagenicity, teratogenicity and other human health effects;
- o persistence, ubiquitous presence in the environment and environmental hazard;
- o short-term and long-term impacts, and the effects of the chemical when combined with other chemicals in the environment;
- o the amount of chemical used; and
- o the availability of safe alternatives.

A number of ways exist to operationalize these criteria. We recommend that the responsibility rest with a joint U.S./Canadian task force set up by the respective federal Governments. The International Joint Commission could act as a coordinating body and/or assist in the development of the sunset criteria. The public must be consulted in all aspects of this task force's work, and the task force should submit its recommendations to the U.S. and Canadian Governments by the September, 1993 biennial meeting of the IJC.

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* In the early 1980's, the IJC's Water Quality Board identified 362 chemicals of concern in the Great Lakes. These chemicals will be the target group to which the criteria will be applied.

3.2.2. Developing a Sunset List

Once the criteria are developed, a mechanism for weighing the criteria and prioritizing chemicals to be phased-out and banned must be developed. Ultimately, a so-called Sunset List can be established. The number of chemicals on the list depends completely on scientific and environmental evidence. The list should be periodically up-dated once new information about certain substances is available.

3.2.3. Implementing the Phase-outs

This third element, the implementation stage, must include specific timetables for phase-outs and bans, forcing industries 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. Timetables and targets should be set by September 1994, one year after the U.S./Canadian task force's criteria are issued.

3.2.4. Sunrise Chemicals

The fourth element consists of applying the criteria to all new chemicals, whether products, raw materials or intermediate substances. This approach, also called the "Sunrise Process", establishes a screening process in which new chemicals must be demonstrated not to bioaccumulate or threaten the health of fish, wildlife or people. As stated by the International Joint Commission,

> "An essential part of the strategy to stop the introduction of persistent toxic chemicals into the Great Lakes Basin Ecosystem must be to prevent new, harmful chemicals from entering the market place."[23]

One principle is particularly important in this process. The company or 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.

3.3. Issues For Further Examination

The above sections outline the essential elements of a Sunset Chemical Protocol for the Great Lakes. There are, however, a host of other issues pertaining to its implementation. A number of key issues are briefly discussed below.

3.3.1. Legal Authority for a Sunset Chemical Protocol

Under current laws, there is legal authority to undertake the Protocol, although the political focus or attention to do so may be lacking.

In the U.S., the Toxic Substances Control Act (TSCA)[24] provides a mechanism to regulate toxic substances before, during and after their manufacture, marketing and use. Several sections under TSCA allow the U.S. Environmental Protection Agency (EPA) to prohibit or ban toxic chemicals.[25] However, it has been observed that TSCA has not fulfilled its potential of eliminating the risks caused by persistent toxic substances. Gary Davis of

the University of Tennessee has stated:

> "TSCA is the sleeping giant of federal environmental legislation. It has the potential to accomplish much positive change.... Further, there is no clear goal behind TSCA to reduce the use of toxic chemicals and to promote safe substitutes."[26]

Similarly, the Canadian Environmental Protection Act (CEPA), passed in 1988, clearly reflects the "cradle-to-grave" or life cycle approach to environmental management.[27] However, this statute, and its predecessor, the Environmental Contaminants Act, have regulated only some nine chemicals.

In the U.S. case, a preliminary review of the eight Great Lakes state environmental laws reveals a minimal number of provisions related to phase-outs and bans of hazardous chemicals.[28] Most state regulations governing hazardous chemicals include requirements for their storage, transportation or disposal. For the most part, State laws do not address the manufacture, processing and use of chemicals, or their distribution in commerce.

In Canada, the provinces have legislative authority to regulate toxic substances. In the past, provinces have on occasion banned toxic substances, although most of these efforts were through specific legislative enactments.

3.3.2. The Regional Aspect of a Sunset Chemicals Protocol

While the legal authority at the federal level may exist to ban substances, the question is whether a Sunset Protocol can be undertaken regionally (such as in the Great Lakes) or whether such action can only proceed on a national, or indeed international, level. Perhaps the ideal situation is to have the most dangerous chemicals banned on a global basis to ensure that such chemicals are removed from the market place and the environment. In practice, however, efforts to phase-out chemicals at both the international and national levels have been slow. While national action is potentially more effective, a regional Protocol may nevertheless have a number of benefits. First, regional action may spark provincial, national, and perhaps global endeavours. For example, in Canada, the phase-out of CFCs was sparked by municipal action, which later prompted both provincial and national efforts.

Second, a regional approach provides the opportunity to build a consensus among industry, government and the public within a reasonable time. Further, it forms the strongest case from an ecological point of view. Studies documenting ecological impacts of certain chemicals could justify regulatory action in one region, while similar evidence may not be present in other regional ecosystems.

3.3.3. Institutional Needs

Another issue is whether an institutional framework exists to undertake and implement a Sunset Chemical Protocol. While there are various institutions such as environmental agencies, which may have the technical competence to undertake the needed tasks, an "extra-governmental" approach may be preferable. The advantages of using an extra-governmental approach, in which important decisions are not made by civil servants or politicians, are:

- o it includes all stakeholders;
- o the results are achieved faster; and
- o the process is politically more palatable.

Given this context, a number of institutional requirements will be necessary. First, a multi-stakeholder task force comprised of industry, environmental groups, labour, and relevant experts should provide an oversight function. Second, to assist in the coordination and research activities, a role could be given to the International Joint Commission (IJC). The IJC could be requested, by way of a reference, to assist the multi-stakeholder task force by:[29]

(a) developing bioconcentration factor methodology common to all jurisdictions in the Great Lakes basin;

(b) assisting in determining hazardous properties that justify sunsetting;

(c) identifying alternatives to chemicals or processes; and

(d) establishing a data bank on sunset information from all jurisdictions, including a catalogue and report on the chemicals that have been sunset in other jurisdictions.

3.3.4. Socio-Economic Issues

If processes, products and chemicals are to be phased-out, it is clear that mechanisms will be required to mitigate or compensate for the dislocation of industry and workers. While a Sunset Chemical Protocol is designed to assist workers by eliminating their toxic working conditions,[30] there is still the possibility that some workers may have to be retrained or relocated.

One proposal that deserves attention is a suggestion to create a fund assisting workers during the transition period. This "Superfund for Workers", modelled after the GI Bill of Rights enacted after the Second World War, could be an effective tool to mitigate negative social impacts from initiatives protecting the environment. The objectives of this Superfund have been proposed as follows:

> "Workers who lose their jobs as a result of the effort to clean up the environment, reduce toxics, protect workers' or the public's health and safety, or convert to an economy less dependent on military production should not lose substantial income or benefits, but should instead be offered the opportunity to prepare for new careers."[31]

More recently, "The Clean Air Employment Transition Assistance", part of the 1990 amendments to the U.S. Clean Air Act, has aimed at providing at least some support to coal miners who have lost their jobs due to the acid rain provisions of the amendments.[32]

The exact details of the structure and implementation of a

Superfund for Workers have been described elsewhere.[33]

4. Conclusions

> "By 1986, more than 500 chemicals and chemical products had been banned altogether or had their uses severely restricted in the country of origin."
>
> - The World Commission on Environment and Development[34]

Persistent toxic substances are causing significant harm to the Great Lakes and its residents. The costs of releasing persistent toxics into the Great Lakes range from human health impacts and ecological damage to tremendous clean-up costs of toxic hotspots. It is clear that traditional end-of-the-pipe pollution control has failed the Great Lakes. Thus, new prevention-based approaches are required. The Sunset Chemical Protocol provides an economically and ecologically sound policy option.

Endnotes

1. The U.S. Council on Environmental Quality, 1990. Environmental Quality: Twentieth Annual Report, Executive Office of the President, page 363.

2. The Canadian Institute for Environmental Law and policy and the National Wildlife Federation, 1991. A Prescription for Healthy Great Lakes, Report of the Program for Zero Discharge, Toronto, Ontario.

3. William Reilly, 1989. "The Turning Point: An Environmental Vision for the 1990's", Environment Reporter, December 8, 1989, page 1387.

4. T.E. Colborn et. al., 1990. Great Lakes, Great Legacy, The Conservation Foundation and the Institute for Research on Public Policy, Washington, D.C.

5. See for example: Tom Muir and Anne Sudar, 1987. Toxic Chemicals in the Great Lakes Ecosystem: Some Observations, Environment Canada, Ottawa, Ontario.

6. See: S. Jacobson et. al., "The Effect of Intrauterine PCB Exposure on Visual Recognition Memory", Child Development, Vol. 56, 1985, pages 853-860. And: S. Jacobson et. al., "Effects of in utero Exposure to Polychlorinated Biphenyls and Related Contaminants on Cognitive Functioning in Young Children.", Journal of Pediatrics, Vol. 116, 1990, pages 38-45.

7. International Joint Commission, 1990. Fifth Biennial Report on Great Lakes Water Quality - Part II, page 15.

8. G. Monroe, W.P. Bradley and F. Neuber, 1990. Profit from Pollution Prevention: A Guide to Waste Reduction and Recycling in Canada, 2nd edition, the Pollution Probe Foundation, Toronto, Ontario, page 8.

9. The Northeast-Midwest Institute, 1989. Cleaning up the Great Lakes Areas of Concern: How much will it Cost?, Washington, D.C., page 1.

10. A. Sudar, et. al., 1989. Costs and Consequences of Uncontrolled Toxic Waste Sites along the Niagara River, in Water Resources Journal of Canada, Vol. 24, No. 2, pages 279-297.

11. The Canadian Institute for Environmental Law and Policy and the U.S. National Wildlife Federation, 1991. A Prescription for Healthy Great Lakes, page 9.

12. Adapted from a presentation by Joanna D. Underwood, President of Inform Inc., at a workshop entitled "Pollution Prevention/Business Modernization Linkages", Chicago, September 18, 1990. Based on data from the U.S. Toxics Release Inventory.

13. The Government of Canada, 1991. Toxic Chemicals in the Great Lakes and Associated Effects - Volume 1 and 2, Environment Canada, Department of Fisheries and Oceans and National Heath and Welfare, Ottawa, Ontario, Figure 4, page 100.

14. The Government of Canada, 1991. Toxic Chemicals in the Great Lakes and Associated Effects - Volume 1 and 2, Environment Canada, Department of Fisheries and Oceans and National Heath and Welfare, Ottawa, Ontario, Figure 4, page 100 and Figure 6, page 102.

15. See: The Government of Canada, 1991. Toxic Chemicals in the Great Lakes and Associated Effects - Volume 1 and 2, Environment Canada, Department of Fisheries and Oceans and National Heath and Welfare, Ottawa, Ontario. Some of the impacts noted include:

    (a) birth defects in fish-eating birds are reported for vast areas in every Lake;

    (b) population declines have been observed for many species, including bald eagles, mink, snapping turtles and lake trout; and

    (c) reproductive effects, eggshell thinning, tumours, generational effects and behaviourial change have all been observed for a variety of species.

16. Data taken from: Barry Commoner, 1988. "Failure of the Environmental Effort", Environmental Law Reporter, Vol. 18, June 1988, page 10197.

17. Great Lakes Water Quality Agreement of 1978 as amended by Protocol signed November 18, 1987, Annex 12.

18. Barry Commoner, 1988. "Failure of the Environmental Effort, Environmental Law Reporter", Vol. 18, June 1988, page 10198.

19. Other examples are: Jeffery Foran, "Sunset Chemicals", International Environmental Affairs (forthcoming); and, Paul Muldoon, "Sunset Chemicals - The Dawning of a Less Toxic Canada" Probe Post, vol. 14:1 (Spring, 1991), 12-14.

20. The Canadian Institute for Environmental Law and Policy and the U.S. National Wildlife Federation, 1991. A Prescription for Healthy Great Lakes, report of the Program for Zero Discharge, 63 pages. The highlights of its strategy include:

    (a) implementing a toxics freeze, prohibiting new or additional discharges of the 362 chemicals identified as a concern in the Great Lakes;

    (b) implementing a Sunset Chemicals Protocol, with an immediate ban of chemicals that have a bioconcentration factor over 250; and

    (c) implementing toxic use reduction programs consisting of eight specific components.

21. IJC Virtual Elimination Task Force, 1991. Persistent Toxics Substances: Virtually Eliminating Inputs to the Great Lakes, draft report.

22. Congressional Record - Senate, May 15, 1991, page S5913 and S5914.

23. The International Joint Commission, 1990. Fifth Biennial Report on Great Lakes Water Quality - Part II, Ottawa, Ontario/Washington, D.C., page 21.

24. 15 USC 2401 et seq (1976).

25. For example, see the following provisions of TSCA:

Section 5(e): The U.S. EPA is empowered to "prohibit or limit the manufacture, processing, distribution in commerce, use or disposal or to prohibit or limit any combination of such activities," pending information with respect to a new substance.

Section 5(f): If the EPA Administrator finds reasonable basis to conclude that a chemical substance presents an unreasonable risk of injury to health or the environment, the administrator may issue a proposed order to prohibit the manufacture, processing, or distribution in commerce of the substance.

Section 6(a): If the manufacture, processing, distribution, use or disposal of an existing chemical or mixture

"presents an unreasonable risk of injury to health or the environment", the Administrator has broad authority to prohibit or limit production.

Section 13: The Administrator may ban or prohibit the import of any chemical substance or mixture if it fails to comply with any provisions under the TSCA.

26. G.A Davis, 1990. Securing Safe Substitutes: Policy Measures to Promote Safe Chemical Substitutes, University of Tennessee, unpublished report.

27. Specific statutory provisions of the Canadian Environmental Protection Act relevant to bans, phase-outs or substitutions include (An Act Respecting the Protection of the Environment and of Human Life and Health, S.C. 1988, c.22):

Section 27: The Minister may prohibit any manufacture or import of any substance if it is not in accordance with the requirements under CEPA.

Section 40: The Minister may replace a substance or product with one that does not pose a danger to the environment or to human life or health.

28. J.A. Foran and A. Jarrell, 1991. An Analysis of the Statutory Framework for the Ban or Phase-out of Hazardous Chemicals, report submitted to the Virtual Elimination Taskforce of the International Joint Commission. George Washington University, Washington, D.C., page 31.

29. These recommendations were taken from: The Canadian Institute for Environmental Law and Policy and the National Wildlife federation, 1991. A Prescription for Healthy Great Lakes, Final report of the Program for Zero Discharge, 63 pages.

30. Workers dealing with toxic chemicals have traditionally suffered more than anyone else in society. Statistical analyses show that the health of such workers is consistently worse than the rest of society. See: Law Reform Commission of Canada, 1986. Workplace Pollution, Working Paper 53, Ottawa, Ontario, page 5.

31. L. Wykle, W. Morehouse and D. Dembo, 1991. Worker Empowerment in a Changing Economy; Jobs, Military Production and the Environment, The Apex Press, New York, page 77.

32. L. Wykle, W. Morehouse and D. Dembo, 1991. Worker Empowerment in a Changing Economy; Jobs, Military Production and the Environment, The Apex Press, New York, page 47.

33. L. Wykle, W. Morehouse and D. Dembo, 1991. Worker Empowerment in a Changing Economy; Jobs, Military Production and the Environment, The Apex Press, New York, 84 pages

34. The World Commission on Environment and Development, 1987. Our Common Future, Oxford University Press. New York, page 224.

SUNSET CHEMICALS

The dawning of a less toxic Canada.

"DDT, DDT, is good for m-m-me!" In the late 1940s, this lyrical slogan was featured in a magazine advertising campaign. By the early 1960s, Rachel Carson's famous book, *Silent Spring*, had revealed the disastrous effects of the chemical and had awakened the consciousness of millions to the problems of toxic contamination of the environment.

Some 30 years later, though, how far have we come in dealing with this problem? Last November a photography student at Toronto's Ryerson Polytechnical Institute, Jeremy Lynch, made headlines when he claimed he had been able to develop photographs from polluted water taken from Lake Ontario. And in the Gulf of St. Lawrence, some beluga whales are so laden with toxic chemicals their carcasses are considered hazardous waste.

"We are living with a toxic legacy — leaking hazardous waste landfills, groundwater contaminated by pesticides, toxic-laced air pollution," says John Jackson, coordinator of the Toxic Waste Research Coalition, an environmental group based in Vineland, Ontario. "The locations of the toxic problems may be different, but the stories are all the same."

Something must be going wrong.

After all, it's not as if there were no laws governing toxic chemicals. Quite the opposite. At the federal level alone, 24 departments have responsibility, under some 30 statutes, over different aspects of controlling toxic substances. Add to those efforts the myriad of provincial and municipal laws and agencies.

It is also not as if there were no money being spent on the control of toxic substances. Industry keeps boasting of the vast amounts it devotes to protecting the environment. Similarly, government expenditures on environmental protection have been rising steadily. Since Ontario announced a new water quality program four years ago, for example, funding for the program has increased from $1 million a year to over $20 million a year, and more than 250 staff positions have been created.

Nor is the public indifferent to the problems of the environment. Virtually every poll suggests the environment is one of the top three issues of the day in the minds of Canadians. Pollution Probe, for example, receives on average more than 100 telephone calls a day requesting information on some aspect of the environment.

Why, then, is the battle against toxic chemicals still being lost in Canada? The answer is surprisingly simple. Our standard approach to dealing with toxic chemicals is fundamentally wrong. For decades, the response has been to *control* the billions of pounds of pollution entering the environment every year. For a variety of reasons this pollution control approach has failed.

Pollution Control

First, it asks the wrong question — "how much is too much?" "Too much" means there must be discernible harm to human health or the environment, and usually it is up to the public to prove there is harm, and the proof can be elusive. According to Susan Sang, an ecologist with the Canadian Institute for Environmental Law and Policy (CIELAP) in Toronto, "the time between the release of a chemical and the injury to the environment may be years. And there is precious little information on the majority of the 70,000 chemicals now in commercial use in North America and virtually no information on the combined or synergistic effects of chemicals."

The pollution control approach has also failed because it ignores important differences between chemicals. For chemicals that persist in the environment for a long time and accumulate in fish, wildlife and humans, there is no safe level. Because they do persist, the concentrations of these chemicals can magnify. For example, the concentration of hexachlorobenzene has been found to be two million to 18 million times higher in herring gulls than in water, and concentrations of PCBs can be 33 million to 333 million times higher.

Many environmentalists argue that we should be asking not how much is too much, but whether we want certain toxic chemicals to be used or released into the environment at all? If the answer is no, then we must stop using those chemicals.

"When you look at the few success stories in the fight against toxic chemicals, the conclusion is obvious," says Burkhard Mausberg, a toxics researcher at Pollution Probe. "The only times we've made substantial and long-term reductions in toxic releases to the environment is when we've banned a chemical or phased it out. We've only asked the right question a few times, and then we've answered by banning something."

If the toxics problem is to be overcome, a new approach is needed, one that is based on either banning the worst pollutants outright or phasing them out over time. Such an approach has been proposed in Sweden, where the chemicals involved are called "sunset chemicals."

The idea of banning chemicals, however, is not new. Most countries, including Canada, have banned DDT, mirex and CFCs. However, the difference with a sunset chemical program is that the banning of chemicals would no longer be done haphazardly. Instead, a coherent and systematic process would be established, based on criteria agreed to by government, industry and the public.

The idea of a systematic program to ban or phase out the worst chemicals is catching on. "A year ago, a proposal to develop a hit list of the most hazardous chemicals and then act on that list would have been ludicrous," says Jackson. "Now, the concept is being debated at every major forum that deals with toxic chemicals."

A number of countries, including Sweden and Denmark, are beginning to draw up lists of chemicals whose use, generation, manufacture, and release into the environment would be banned or phased out in accordance with specif-

Sunset for dangerous chemicals

SIR—Work on existing chemicals that are dangerous to man and/or the environment tends to focus on one issue at a time, at present chlorofluorocarbons (CFCs). For many years, polychlorinated biphenyls have been given the same intense attention. Plans to phase out these chemicals are under way. But such plans take a long time to develop, are very resource-demanding and may lead to development of alternatives that pose other threats.

In my view, however, the number of chemicals that need to be phased out is too large to allow time to proceed case by case. My suggestion is that we try to establish a process, nationally or, preferably within some international organization, such as the Organisation for Economic Development (OECD), whereby chemicals that need to be phased out (sunset chemicals), are identified according to generally accepted criteria.

The procedure might be as follows.

(1) Identify, according to set criteria, a number of chemicals (say 50 or 100) that should be phased out.

As a basis, lists of 'priority' chemicals, or of chemicals with specific hazardous properties — carcinogenic, mutagenic, teratogenic or hazardous to the environment — could be used. Criteria should be established whereby 'multiproblem' chemicals are distinguished. Step 1 would involve setting-up expert committees to develop criteria and the chemicals to be selected.

(2) Advertise the list, giving a proposed date for the phasing out of each chemical. At this stage, industry must be allowed to argue why a certain chemical should not be phased out. In Sweden this means that industry has to prove beyond reasonable doubt that the chemical in question is not a candidate for a sunset list.

(3) Once the list has been agreed to, nationally and/or internationally, companies could be obliged to report annually on the development of the phase-out. There should be a rule that no company must report a figure similar to or higher than that of the year before.

It is important to stress the quantitative aspect of the process because these are chemicals we want to get rid of. Companies may of course also report on protective measures, but this must not confuse the goal. The Swedish experience, for example with the Halving of Pesticides Programme, shows that such quantitative goals promote incentive and ingenuity.

(4) Results should be published regularly. On a national level, companies could compete, for example, for the title 'Company of the year'.

(5) The process should end with a ban, the sunset. Such a ban should be inherent in the process from the start. Responsible companies will have developed alternatives or closed processes, while less responsible companies will be punished for not having done so. Discussions and agreements between governments and industry will be a normal part of the process.

Such a process may be started at a national level and implemented by national legislation and regulation. As most chemicals move extensively in international trade and thus appear in, for example, many OECD member countries, the process needs to be internationalized. And a common understanding of the process within the international community would be an important step towards greater co-operation and harmonization between countries. The OECD could set an example to the rest of the world and take a strong lead on the road to a sustainable future.

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