1991-09-12

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LEGISLATIVE AND REGULATORY ASPECTS OF VIRTUAL ELIMINATION

A COMPILATION OF REPORTS SUBMITTED TO THE VIRTUAL ELIMINATION TASK FORCE

- An Analysis of the Legislative and Regulatory Factors in a Virtual Elimination Strategy for Persistent Toxic Substances in the Great Lakes Basin Ecosystem
  By Lee Botts, Environmental Consultant, Gary Indiana, and
  Glenn Paulson, Pritzker Institute of Environmental Engineering, Chicago, Illinois

- Summary of Ideas Discussed at the April 11-12, 1991 "Roundtable on the Achievement of Zero Discharge Through Legislation and Regulation"
  By James G. Chandler, IJC, Washington, D.C., and
  Michael J. Veschler, IJC, Ottawa, Ontario

- Policy and Regulatory Opportunities for the Implementation of Virtual Elimination in the Great Lakes Basin
  By Isobel W. Heathcote, Wyndham Research Inc., Toronto, Ontario

- An Analysis of the Statutory Framework for the Ban or Phase-Out of Hazardous Chemicals
  By Jeffery A. Foran and Ann Jarrell
  George Washington University, Washington, D.C.

As of September 12, 1991
AN ANALYSIS OF THE LEGISLATIVE AND REGULATORY FACTORS IN A
VIRTUAL ELIMINATION STRATEGY FOR PERSISTENT TOXIC SUBSTANCES IN
THE GREAT LAKES BASIN ECOSYSTEM
A Report Submitted To
The International Joint Commission
Virtual Elimination Task Force

By

Lee Botts
Environmental Consultant
9731 Pine
Gary, Indiana 46403
Glenn Paulson, Ph.D.
Research Professor
Pritzker Institute of Environmental Engineering
Illinois Institute of Technology
Chicago, Illinois 60616-3793
ACKNOWLEDGEMENT

Cameron Davis, Kent College of Law, Chicago, Illinois, contributed research assistance in preparation of this report.
EXECUTIVE SUMMARY

Public and Congressional support for Great Lakes Water Quality Agreement goal of virtual elimination of persistent, bioaccumulative toxic contaminants from the Great Lakes appears to be gathering momentum in the United States. Increasingly support for control of toxic contamination includes acceptance of the goal of virtual elimination of persistent, bioaccumulative pollutants. This goal will be accomplished only if appropriate regulatory effort is focused on all three classes of sources: current point sources, current nonpoint sources and sediments contaminated by past activities. Integration of effort across all programs for different media, air, water and land, will also be required.

Even with apparent acceptance of the goal in new initiatives by the U.S. Environmental Protection Agency (USEPA), it remains to be seen how aggressively it will be sought. USEPA has resisted recognition of binational objectives for the Great Lakes in its regulatory programs in the past. Encouraging signs of change in attitude toward the Great Lakes in both its Washington headquarters and in regional offices suggest that the agency may now be willing to employ all its available regulatory authority toward the virtual elimination goal.

The agency also appears to be promoting voluntary adoption of pollution prevention practices by industry to avoid future contamination. While the agency lacks regulatory authority to require pollution prevention, it is seeking innovative ways to join pollution prevention planning to enforcement and permit issuance. The expanding public constituency and Congressional demand for "zero discharge" are likely to reinforce the agency's desire to address Great Lakes problems in new ways.

To most environmental advocates, zero discharge means bans on use of specific substances or substitution of new technologies that allow elimination of use of unacceptably dangerous chemicals. Prohibition of use of certain substances is consistent with a broader interpretation of virtual elimination, which must include cleanup of past accumulations.

As the experience with polychlorinated biphenyls (PCBs) demonstrates, even with bans on manufacture and new uses, virtual elimination requires removal of accumulations in the environment plus prevention of new inputs from past uses plus prevention of new inputs. Experience with PCBs illustrates the limitations of bans alone.

Nevertheless, USEPA has sufficient authority under existing law to combine use of bans for some substances with aggressive control of current inputs. Experience with phosphate detergent
bans demonstrates that action can be achieved in the Great Lakes basin without federal legislation but quicker, more consistent results will be obtained if the USEPA uses its powers under existing laws. The federal agency can require and encourage the states through the delegation of authority, federal guidance and funding mechanisms. This process could be undermined by lack of funding and by state resentment of additional responsibility under federal mandate while the trend toward decline of federal funding continues.

This report examines how federal and state pollution control programs may be moving toward regulation for "virtual elimination...in the philosophy of zero discharge" through development of consistent state water quality standards that shift the burden of proof to the discharger. It considers limitations to abatement of contamination from diffuse nonpoint sources and sediment concentrations but notes that enforcement authority is being used more creatively together with vigorous promotion of pollution prevention.

New Great Lakes legislation may provide needed information about loadings and sources to allow application of a mass loading approach. Truer cross-media integration would facilitate a mass balance approach to regulation and cleanup by allowing, for example, a single permit to be issued for a facility that identifies all uses and transfers. Political barriers in the committee structure of Congress constrain development of appropriate legislation and current efforts are proceeding under existing law.

Industry resistance to stricter regulation may be a constraint but some companies appear ready to respond to the public's demand for control of toxic contamination by changing technologies and modernizing production practices to prevent pollution. The key to virtual elimination of toxic contamination is public understanding of ecological processes. For the future as in the past, public education must be a major element of an overall strategy.
I INTRODUCTION

DEVELOPMENT OF THE GOAL OF VIRTUAL ELIMINATION

In the 1970s, the Great Lakes basin served as a laboratory for lowering phosphorus loadings to reverse eutrophication through procedures instituted under the binational Great Lakes Water Quality Agreement. Today the more difficult struggle for virtual elimination of critical persistent toxic substances is also occurring within the Agreement's framework.

Reduction of phosphorus loadings was the main goal of the first Great Lakes Water Quality Agreement when it was signed in 1972. The processes of monitoring and research that it established provided a forum for information exchange as bioaccumulation of persistent chemicals and heavy metals and their effects were recognized in the Great Lakes system.

The goal of elimination of toxic contaminants was introduced into the 1976 agreement with a call for an "ecosystem approach to management." From the 1970s through the 1980s, concern about how the region's unique natural resource serve as a sink for persistent contaminants grew as the extent of contaminant accumulation in the Great Lakes was confirmed.

Although the Great Lakes Agreement is between the federal governments, the governors and premiers met in 1972 in effect to ratify its aims. In 1986 the governors of all eight Great Lakes states cited the agreement in a formal pledge to work together to reduce toxic contamination "to the maximum extent possible."

The 1987 agreement added new protocol that support the Agreement goal of virtual elimination of persistent contaminants from the Great Lakes basin ecosystem. In the same year, a Great Lakes provision was included in amendments to the Clean Water Act. The amendment in Section 118 had been sought by environmentalists since the early 1980s to give USEPA a specific legislative mandate to incorporate objectives of the agreement into federal water quality programs.

USEPA policymakers in Washington contended that the use of Great Lakes waters should be regulated in the same way that the agency regulated all other waterways, as if lakes are flowing streams with capacity to assimilate all forms of pollution. Initially, the agency had refused to consider stricter discharge standards for the Great Lakes under the Refuse Act permit system that preceded the Federal Water Quality Act amendments of 1972, now known as the Clean Water Act.

In the late 1970s, top water management officials even argued that less priority should be given to Great Lakes problems because "they are so much cleaner than other waterways." In other words, the agency did not distinguish between pollution by conventional pollutants such as biochemical oxygen demand and
dissolved solids and contamination of the ecosystem by bioaccumulation of persistent toxic substances. Nor did USEPA give the states any specific guidance for the Great Lakes to be applied in setting water quality standards and issuing discharge permits.

The lack of understanding of the significance of emerging evidence of threats to both human and ecological health by toxic chemicals was reflected in the annual budgets submitted by USEPA headquarters to Congress. The effort to maintain Great Lakes programs required by the binational agreement was an annual struggle from the mid-1970s through the 1980s as USEPA continued to contend that the level of funding Congress desired for Great Lakes research and management was not justified.

The view was that the agency's national program under the Clean Water Act had priority over obligations under the Great Lakes Agreement and that the huge lakes were protected by their vast dilution capacity. The attitude continued to be reflected in agency policy even after Congress adopted the Great Lakes amendment in 1987.

According to private communications of water program managers, legal staff of both USEPA and the U.S. Department of Justice maintained that the amendment's directive "to seek to attain" the objectives of the Great Lakes agreement did not obligate the agency to accept the objectives as their own. Although Administrator William Reilly has now directed otherwise, some officials still hold the opinion that specific recognition of Agreement objectives is unnecessary because the Great Lakes are adequately protected under broader goals of the Clean Water Act.

The agency's continuing reluctance to adopt the virtual elimination goal for toxic substances in regulatory programs fueled citizen demands for zero discharge in the 1989 biennial IJC meeting in Hamilton, Ontario. The call for zero discharge and new demands for pollution prevention in addition to pollution control and remediation are now ongoing issues almost everywhere that Remedial Action Plans are underway in the Areas of Concern identified under the Agreement. The same themes have emerged for the Lakewide Management Plans for Lake Michigan and Lake Ontario and also were reflected in 1989 Congressional field hearings on USEPA Great Lakes programs.

In 1990 and 1991, the constituency for zero discharge has expanded beyond the environmental organizations who previously advocated the goals of the Great Lakes Agreement to grassroots organizations who oppose local waste disposal facilities. The merging of advocacy for the agreement by groups who support zero discharge in its narrow meaning of bans on certain substances and by groups who participate in all aspects of environmental regulation enhances the political influence of the zero discharge/virtual elimination concept. National and regional traditional environmental organizations and local grassroots activist groups
are working together in joint pursuit of stricter regulation of hazardous materials throughout the Great Lakes basin.

THE EXPANDING CONSTITUENCY FOR CONTROL OF TOXICS SUBSTANCES

The whole spectrum of organized citizen environmental groups is represented in a new coalition called the Zero Discharge Alliance. Asserting that "zero means none" in a statement of principles, the alliance claims upwards of 50 organizational members, some of whom constitute large coalitions in their own right. The Zero Discharge Alliance is a growing network of activists on behalf of zero discharge that extends across all jurisdictional lines on both sides of the border.

Greenpeace, a member of the Zero Discharge Alliance, has launched a campaign of its own to achieve a ban on use of chlorine in the pulp and paper industry initially and for all other purposes eventually. The Greenpeace objective has been adopted by many members of the Zero Discharge Alliance and will be supported by a special Great Lakes campaign in the summer of 1991.

The Great Lakes Natural Resources Center of the National Wildlife Federation with the Canada Center for Environmental Law and Policy has proposed a strategy for eliminating persistent bioaccumulative toxic substances from the Great Lakes in 25 years. The strategy calls for cleanup of existing contamination in sediments and a basin-wide antidegradation policy for ongoing discharges of waste in addition to aggressive pollution prevention.

Great Lakes United and the Lake Michigan Federation have new programs to promote prevention of future pollution by persistent toxic substances as well as cleanup of contaminated sediments. These and other regional organizations plus national organizations including the Sierra Club, the Izaak Walton League and several local groups in the Great Lakes region are leading the effort to factor Great Lakes concerns into lobbying strategy now being developed by a national environmental coalition for upcoming reauthorization of the Clean Water Act. With new laws and programs in 1990 and 1991, both Congress and USEPA appear to be responding to the expanding constituency for elimination of toxic contamination from the Great Lakes.

NEW LEGISLATION AND NEW USEPA DIRECTIONS

In 1991, new directions in USEPA policy appear to signal acknowledgement of the virtual elimination goal of the Great Lakes Agreement in agency programs. The potential significance of these major policy shifts by USEPA and new legislation in the 101st Congress as well as the growing public support should be considered in any IJC strategies for virtual elimination.
In 1990 Congress adopted eight new laws aimed at enhancing protection of Great Lakes resources. One law seeks to prevent introduction of exotic species. Another directs the Coast Guard to increase oil pollution control efforts in the Great Lakes. The Army Corps of Engineers is given authority to dredge for environmental cleanup outside navigation channels and directed to assist in development of Remedial Action Plans. New studies of fish and wildlife problems are authorized as well as inclusion of Great Lakes shoreline in the Coastal Barriers Resources System. Three laws in particular provide new opportunity for achievement of the virtual elimination goal of the Great Lakes Agreement.

The Great Lakes Critical Programs Act (PL 101-596) strengthens the Section 118 amendment to the 1987 Clean Water Act and leaves no doubt of the Congressional intent that USEPA incorporate objectives of the Great Lakes Agreement into its regulatory programs. The new amendment adds deadlines for development of guidance for consistent water quality standards everywhere in the basin as well as for submission of Remedial Action and Lakewide Management Plans to the International Joint Commission. As discussed below, the new provision means that USEPA should propose new antidegradation guidance by July, 1991.

Title 3 of the Clean Air Act (PL 101-952) expands USEPA authority to regulate hazardous air pollutants with specific reference to atmospheric deposition of toxic contaminants into this law should result in coordination between air and water programs for Great Lakes protection that has been lacking in the past.

The Pollution Prevention Act of 1990 (H.R. 5931), like Title 3 of the 1986 Superfund law, embodies a new trend in U.S. legislation, to augment the traditional "command and control" regulatory approach of earlier laws with non-regulatory "persuasion and promotion" for source reduction. Just as the public disclosure of the Toxic Release Inventory is increasing public pressure for control of toxic materials, the new state and federal pollution prevention laws aim to build public support for voluntary industry action.

While the pollution prevention law has no specific Great Lakes provisions, Administrator William Reilly has directed that the agency adopt a special "U.S. Pollution Prevention Action Plan for the Great Lakes." This program is part of a larger Great Lakes Initiative that implements the administrators designation of the Great Lakes as the demonstration project for the agency's new risk-based, cross-media approach and integration of ecological and human health protection. The action also makes the Great Lakes a national priority for the agency instead of a regional program as in the past.
NEW DIRECTIONS AT USEPA

Both Congressional and citizen concerns seem to be reflected in USEPA Administrator William Reilly's designation of the Great Lakes as the laboratory for demonstrating the most fundamental change in the direction of USEPA policy since the agency was established in 1970. The new policy direction is based on September, 1990, recommendations of the agency's Science Advisory Board.

The major recommendation is that USEPA should take a risk-based approach to protect ecological integrity as well as human health. Pointing out how USEPA has organized its programs in the same way that the environmental laws address separate problems, the advisory board urged the agency to take an integrated approach to today's complex environmental issues. The board suggested that such a cross-media approach could help the agency deal with contradictions and overlapping requirements in various laws.

Finally, the agency is encouraged to use its discretionary authority to put as much effort into preventing environmental risk in the future as into controlling pollution that already exists.

The authors of this paper endorse a risk-based approach to control of persistent contaminants in the Great Lakes. Given, however, the current state of the art of risk analysis, both for human health and particularly for environmental quality, our support must be qualified.

For several key technical issues, notably the transport and fate of persistent toxins, the available evidence does not allow a high level of confidence in exposure evaluations. To cite one example, understanding of the relative importance of atmospheric loading versus sediment release of materials such as PCBs is in flux. Aggressive monitoring and continued research on the fate and transport of this class of contaminants is essential to support a risk-based approach to virtual elimination.

The monitoring and research process under the Agreement may offer another opportunity for coordinated attention by all interested sectors of society, public and private, yet USEPA's proposed 1992 budget raises questions about whether the agency will be able to obtain the information needed to support a risk-based approach adequately. According to analysis by Northeast-Midwest Institute, the proposed administration budget provides increased funding for the USEPA's Great Lakes National Program Office but does not include funding for the research programs authorized in the new legislation.

Thus, although USEPA has set FY 1993 as the target year for full implementation of a new "risk reduction" management policy and Reilly recently informed the governors of the Great Lakes states that reduction of risk to the Great Lakes ecosystem is...
already a national priority for the agency, full appropriation to the authorized levels is unlikely and necessary information to support the policy may not be available.

Still, the influence of the new policy direction already appears to be evident in the workplan of the Region V office in Chicago for FY 1992 and beyond. For the first time, the Air and Radiation Division has set a specific target of reducing atmospheric deposition of critical toxic pollutants by 50 percent by 1995. Activities in support of achieving the target reduction include development of criteria for screening of air emission permits for Great Lakes impacts, enforcement actions for coke ovens and establishment of air toxic control requirements for municipal waste incinerators under Section 111 (d) of the Clean Air Act.

The Great Lakes Pollution Prevention Plan incorporates a national Industrial Toxics Project into the agency's Great Lakes efforts. In February, 1991, Reilly announced an effort to enlist voluntary participation by major industry in achieving the agency's goal of a 33 percent reduction in release of 18 toxic chemicals into the environment by 1992 and a 50 percent reduction by 1995.

The list of chemicals was generated from lists developed by each program office to set priorities for reduction of releases of specific chemicals into the environment. The chemicals that appeared on the list of more than one program was then reviewed according to three criteria: high volumes of use, potentially serious health and environmental hazards and substantial possibility of reductions of release by pollution prevention.

Users of the chemicals were then identified through the Toxics Release Inventory required under Title 3 of the Superfund Amendments and Reauthorization Act of 1986. Reilly has sent letters to all the more than a thousand users of the chemicals asking for voluntary pollution prevention agreements. Reilly has committed to meeting personally with the top management of the largest users. Top program managers will consult with others.

Regional offices have also been directed to seek such pollution prevention agreements from companies and facilities. In general, it is expected that the headquarters staff will concentrate its efforts on top management of major companies and the associations that represent the interests of various industries. Regional offices have been given considerable latitude in deciding how to deal with smaller companies and separate facilities of national companies located in their areas.

A special work group has developed many suggestions for follow up actions to Reilly's initial approach to corporate leaders. The actions range from providing technical assistance to smaller companies to focusing inspection and enforcement actions on the listed chemicals to publicizing reductions under pollution prevention plans and agreements.
In March, 1991, the plan was expanded to include a joint state and federal "Pollution Prevention Challenge" that will feature awards and recognition for successful pollution prevention efforts. The plan appears to be based on a similar program developed by the Illinois Environmental Protection Agency. The first awards are scheduled to be made to industries, environmental organizations and individuals in connection with the biennial meeting of the IJC in Traverse City in September, 1991.

In Regions II and V, another new USEPA initiative is giving new emphasis to Great Lakes issues. In this approach, the administrator directed that each regional office select the geographic area with the worst environmental degradation for concentration of enforcement actions. Region II has selected the Niagara River area and Region V has selected Northwest Indiana. The concentration of effort is to continue until measurable improvement has been achieved.

Successful major enforcement actions to date include a consent decree covering long standing violations of air and water quality permits at the USX plant in Gary. Innovative features of the consent decree are said to indicate new approaches that will be incorporated in future enforcement cases. Under the consent decree, the company is required to spend at least $34.6 million of which at least $25 million will be spent on specific remedial actions under supervision of the agency.

The company will develop a remediation plan for contaminated sediments, for example, in the Grand Calumet River that includes extensive characterization studies to identify pollutants so that appropriate remedial measures can be taken. In addition to developing pollution prevention plans for the future, the company must install major new monitoring systems for current air emissions and water discharges.

While the enforcement actions have been welcomed by local environmental groups in both areas, questions have been raised about how the public can participate in legal proceedings. Since both areas are also Areas of Concern, another question is how the results of the enforcement actions can be related to the Remedial Action Plans when company actions are specified by court decisions. In spite of these uncertainties, the Geographic Enforcement Initiative also appears to support the virtual elimination goal.

In summary, several features set USEPA's new approach to the Great Lakes apart from previous approaches. One is that, in keeping with the recommendations of the agency's Science Advisory Board, the Great Lakes Initiative overall seeks to reduce risk for both human health and the environment with air, water, waste control and management divisions of the agency all involved in implementation.

Another feature is that the project to integrate effort is
being undertaken without a specific legislative mandate from Congress. Although the action is consistent with the new pollution prevention statute, it is not required as such and can be undertaken without need to adhere to detailed procedures. Thus implementation may proceed without the delay and complications of developing regulations that have hindered implementation of other laws in the past.

Except where court decisions on enforcement cases may set certain requirements, it also means that industry will have opportunity to do what it has long requested: to determine for itself the most efficient way to reduce pollution. The question is how far companies will be willing to go without the threat of enforcement and in response to publicity.

Lack of a legislative mandate also means there is no dedicated funding for this effort. Program offices will either have to divert funds from other purposes or integrate the pollution prevention initiative into ongoing activities. Response is uncertain for an agency known for delay and endless analysis aimed at justifying far less action than mandated by law in the past. The reason, for example, the hazardous air pollutant section of new Clean Air Act lists 189 chemicals to be treated as air contaminants is the failure of the agency to list more than seven substances as toxic under Section 112 of the original legislation.

The Industrial Toxics Project and the Great Lakes Pollution Prevention Plan respond to the agency's reason for establishing an Office of Pollution Prevention in 1988, the conclusion that pollution prevention as a philosophy must be integrated into standard setting, compliance review and enforcement. Barriers to complete cleanup of pollution resulting from past experience are the reason that so much hope for reduction, even virtual elimination, of toxic contamination is now invested in pollution prevention efforts.
PAST FAILURE AND NEW INNOVATION UNDER THE CLEAN WATER ACT

The broadest authority and the most obvious opportunity to incorporate the virtual elimination goal of the Great Lakes Agreement in U.S. environmental policy is provided by the Clean Water Act (PL 92-500 and amendments). Section 101 states that the purpose is "to restore and maintain the chemical, physical and biological integrity of the Nation's waters. . .with a national goal that the discharge of pollutants into the navigable waters be eliminated by 1985."

This goal statement is the basis for the argument that this law provided authority for the virtual elimination goal of the Great Lakes amendment even before the Section 118 amendments in 1987 and 1990. The argument depends on whether the goal is interpreted to apply only to direct discharges of pollutants in "the end of pipe" approach to control whose limitations are recognized in the new emphasis on pollution prevention.

Among those interviewed for this project was a highly placed official in USEPA headquarters who asked that his comments be used without attribution. Agreeing that virtual elimination means more than elimination of direct discharges in light of today's understanding of sources and transport, he observed that 100 percent control of direct discharges would eliminate at best 30 percent of pollutants, leaving contributions by atmospheric deposition and land runoff as well as contaminated sediments.

Before 1972, the aim of federal water pollution control policy was to reduce pollution by setting standards that would achieve prescribed ambient levels of pollutants in the waterways. The 1972 law prescribed a new approach for setting effluent limits by means of National Pollution Discharge Elimination System permits. With an interim deadline of "fishable, swimmable" water everywhere by 1983, Congress intended that new stricter limits would be set in new permits every five years to eliminate all direct discharge of pollutants by 1985.

While the goal was not reached, substantial improvement of water quality occurred. In 1987 Congress made substantial changes in amendments that aimed to abate remaining toxic contamination. The main change was to restore a water-quality-based approach to supplement effluent limits. It was intended that the states and USEPA would use both approaches "to ratchet down" controls until the goal was reached. Thus state water quality standards were to be reviewed every three years subject to federal approval.

According to environmentalists and federal and state agency staff interviewed for this project, the main reason that small progress has been made toward elimination of toxic contaminants is that both the states and USEPA continued to allow mixing zones and dilution for these substances. The use of mixing zones assumes an assimilative capacity for toxic chemicals and metals like the assimilative capacity for such conventional pollutants
as biological oxygen demand and nutrients.

The view today is that there is no assimilative capacity for persistent toxic substances that bioaccumulate in the food chain, for their presence in any amount will concentrate in the ecosystem. This issue is being addressed in the Great Lakes Water Quality Initiative that was organized by the Region V office of USEPA in Chicago about two years ago, with participation by staff from Region II in New York and Region III in Philadelphia. This process, now known within the agency as "the little initiative," preceded Administrator Reilly's more recent and more comprehensive Great Lakes Initiative.

The overall purpose is to provide guidance for development of consistent state water quality standards for the Great Lakes that will eliminate toxic contamination. Lack of appropriate federal guidance has been considered a problem in several ways. Some state agencies feel that the federal agency has not been as progressive as it could be in the best available technology (BAT) guidelines that it is required to provide for industry. One state pointed out that current guidelines allow compliance by 95 percent of existing facilities.

Another problem is that USEPA slowness in development of guidelines and regulations delays industry response. New BAT guidelines for the pulp and paper industry will not be issued before 1995 even though this industry contributes a very high proportion of persistent contaminants.

Environmentalists complain that some states, without penalty by the federal agency, have demonstrated unjustified willingness to allow variances, or exemptions, from pollution control regulations because of economic concerns. State agencies complain that lack of consistency makes them more vulnerable to claims of economic hardship by industry. Although states can adopt stricter policies than federal guidance requires, they do not do so out of fear that industries will move to a location with less stringent requirements.

There are special problems in setting discharge limits so low that substances cannot be detected in the water by existing analytic techniques and whose presence in the lakes is known only because of bioconcentration in fish tissues. Wisconsin now addresses this problem in a water quality degradation rule that uses a bioaccumulation factor of 250 to determine whether a new discharge will lower water quality. This state includes protection of the reproductive capacity of fish and aquatic life as well as acute toxicity as water quality criteria yet still allows mixing zones.

In Michigan, former Governor James Blanchard issued an executive order calling for compliance with the virtual elimination goal. The Michigan agency feels that its water quality standards now use numbers so small that they amount to virtual elimination. Because dischargers are below the level of
detection, years will be required to confirm protection of wildlife because of inability to measure decreases in loadings.

As these issues have been debated in the work group of the Water Quality Initiative, the State of New York and Region II have made the most innovative proposal for how to assure compliance with the antidegradation requirements of the Clean Water Act. The law prohibits increased discharges that would increase the mass loading of a persistent, bioaccumulative substance even if the discharges are below permit limits unless the discharger can demonstrate that the increase is too costly or unavoidable. In the antidegradation policy now proposed, reasonable extra costs to avoid an increase are defined as up to 150 percent of current control costs, unless the discharger can demonstrate substantial and widespread social or economic impact on the community.

Application of the policy is now being considered in criteria aimed at protecting human health, aquatic life and wildlife. The new criteria would incorporate six key changes, as follows:

1. Two levels of criteria would be used, depending on available toxicology data, with Tier 1 applying when adequate data are available to confirm effects. Tier 1 criteria will amount to updating of the standard Gold Book data for the Great Lakes using more recent evidence. For human health criteria, minimum data requirements for Tier 1 include at least one good epidemiological study that demonstrates known or probable human carcinogenicity or a good study of chronic animal exposure that demonstrates a relevant human effect.

2. Tier 2 criteria would be used for possible carcinogens in the absence of available data and would be intentionally set very conservatively. The discharger has the option of carrying out tests to prove lack of carcinogenicity but a low discharge limit cannot be increased later once it has been set. This provision aims to reinforce antibacksliding requirements of the Clean Water Act. It also puts the burden of proof for lack of toxicity on the discharger.

3. The ecosystem management approach is applied in the water quality criteria for protection of wildlife.

4. No mixing zones will be allowed after 2004.

5. To reduce mass loadings, persistent toxic chemicals are defined as organic chemicals that are present in greater than natural quantities in the environment after eight weeks. To date, only mercury and thallium are considered to be persistent heavy metals based on existing data.

6. The criteria include bioaccumulation factors based on the concentration that occurs in the shift from the water column to fatty tissue.
As stated previously, the new Critical Programs Act requires USEPA to publish the proposed new criteria by June 30, 1991. By 1994, the states must adopt water quality standards and antidegradation policies that are consistent with the final guidance.

One criticism that has been made of the strictness of the new policy is that it could result in more industrial discharges to Publicly Owned Treatment Systems (POTWs). Supporters counter that enforcement of the pretreatment requirements of the Clean Water Act would negate this alternative. At present, consistency of enforcement of pretreatment requirements is also an issue. Lack of enforcement was cited by one POTW operator who said his plant frequently receives surges of unpermitted pollution from small and medium facilities.

While an industry group has been organized to oppose the new guidance, no documentation of the basis for the opposition has been made available. The industry opponents are said to have asked Congressional sponsors to repeal the law but there is no evidence that such an action is likely.

The new act also sets out new mandates and deadlines for the Assessment and Remediation of Contaminated Sediments projects first called for in the 1987 amendment. By the end of 1990, the Great Lakes National Program Office was to complete chemical, physical and biological assessments at each demonstration cleanup site and announce which of 18 technologies would be used in the demonstration projects, which are now underway. The agency has until the end of 1992 to carry out full or pilot demonstration projects at all five sites named in the 1987 act.

The fact that accumulations of contaminated sediments are a continuing source of water pollution is another ubiquitous environmental problem that was first recognized in the Great Lakes. Cleanup is complicated by the lack of confirmed methods to destroy the contaminants at reasonable cost.

In the Indiana Harbor and Ship Canal, the problem is compounded by the difficulty of obtaining agreement on a disposal site for either dredge spoils or treatment residuals and by concern about the risks associated with the removal process. Some current technologies can cause a short-term surge of persistent pollutants into the environment that escape control techniques. While some experts argue that leaving contaminated sediments in place could cause less risk to ecological integrity over time as they are covered by natural sedimentation, environmentalists seek cleanup to limit accumulations.

In one project, liophilic compounds, including PCBs, are being removed by solvent extraction. At Waukegan Harbor, volatile PCBs are being extracted at low temperature and captured for high temperature incineration after they have been concentrated.
Bioremediation is being used at Sheboygan Harbor, where the sediments are treated with bacteria first under anaerobic and then under aerobic conditions. In another case magnesium is being used to remove iron that carries lead and cadmium with it. In one Ohio tributary to Lake Erie, sediments were removed by dredging down to bedrock. To date, no technology has been proved both satisfactory and affordable for application on a wide scale.

Lack of funding is a recurring theme in discussions of implementation of the Clean Water Act generally. As discussed above, the trend is for reduced federal funding for state programs. In one state the federal portion of funding for the federally mandated water programs has declined from 60 to 40 to 25 per cent. With a 10 percent budget cut likely for all state programs, environmental officials say they cannot undertake the research needed to develop the data needed for virtual elimination programs.

The State of Indiana is meeting sharp resistance to its efforts to increase funding for environmental programs by sharp increases in permit fees. New York voters defeated a bond issue that would have been used for environmental programs. Waste management laws offer other models for how to finance pollution control.

**BARRIERS TO VIRTUAL ELIMINATION**

The barriers to achievement of the virtual elimination goal over all are a mix of economic, technological, bureaucratic, information and political factors. Virtual elimination of persistent toxic substances that bioaccumulate in the Great Lakes will require two kinds of action: one set to remove as much as possible of the pollutants already in the environment and another set to prevent continuing pollution.

A strategy to foster virtual elimination must weigh how priorities are set in order to obtain the most benefit in use of available resources. Application of the new risk reduction approach should be considered, both because it may help set priorities and because, in any case, it is now being used to guide the decisions of the lead agency in the United States for achieving the objectives of the Great Lakes Agreement.

The risk reduction approach aims to determine what actions are needed to reduce risk to both human health and ecological integrity. The limitations of the risk reduction approach include the lack of information and knowledge to support adequate risk assessment. Costs can also be an economic limitation but, under a risk reduction policy, may also help set priorities.
USEPA's new Great Lakes Initiatives, large and small, promise drastic change in bureaucratic barriers to virtual elimination at the federal level. Full participation by the states is more problematic.

All the Great Lakes governors signed the 1986 toxics agreement, but only the governor of Michigan followed the agreement with an executive order for implementation. At present the Council of Great Lakes Governors is concentrating on promotion of pollution prevention. Equal commitment by the states to remediation is not evident in every state. There is little state participation in the innovative enforcement and other activities of the multyear Geographic Enforcement Initiative by the Region V office of USEPA in Northwest Indiana.

There is promise in the progress toward consistency among state water quality standards for the Great Lakes. Specific federal guidelines for the Great Lakes are also needed for air and waste programs to increase commitment and consistency where states exercise implementation authority under federal guidance.

Lack of integration between programs for different parts of the environment has also been a bureaucratic barrier in the past. Under its new risk reduction policy USEPA appears to be working for integration in its own programs and should encourage comparable cross-media integration of effort by the states.

For the time being, such efforts will have to be undertaken without new legislative authority because of the political barriers that are considered below. Increasing pressures on state budgets and continuing declines in federal funding may undermine such initiatives, even when the intention is present.

A mass balance strategy to eliminate contaminants would facilitate avoidance of transfer of pollution from one environmental compartment to another but is limited now by lack of information about sources and loadings. Again, new federal legislation in 1990 offers new possibilities for obtaining needed data.

The atmospheric deposition study required in the Clean Air Act and the monitoring of confined disposal sites by the Army Corps of Engineers in the Great Lakes Critical Programs Act will provide some needed information. As it has in the past, the IJC can provide a forum for information exchange on Great Lakes research that will result in development of other data needed to support a mass balance approach to remediation and prevention.

Finally, a virtual elimination strategy should consider how to increase public understanding of ecological processes in the Great Lakes. While public support for zero discharge offers the best hope for overcoming political barriers, better public understanding could overcome bureaucratic barriers.
ECONOMIC FACTORS

The chief economic factors are the cost of remediation of pollution that is already in place and the opposition of industry to investment in changing processes and better pollution control. Current laws and environmental programs offer opportunity to deal with two major categories of pollutants in place: contaminated sediments and hazardous materials in use and already disposed of.

For contaminated sediments, one issue is the comparison of risks associated with removing them from the ecosystem in order to virtually eliminate their future contribution to the Great Lakes. The demonstration projects now underway should provide additional information to assist risk analysis of short term and long term risks, whether more pollution escapes into the environment during removal than would be likely if the pollutants are left in place.

The demonstration projects are designed also to assess various technologies. Even if one or more technologies is found to be feasible for wider application, the very high costs are likely to limit removal in the near future. The willingness of Congress to appropriate federal funding for cleanup will depend not only on the technical and scientific results of the demonstration projects but also on political support. Under a risk reduction policy, assessment of the risks and benefits of removal of contaminated sediments should guide public education efforts as well as agency plans.

The Superfund and Resource Conservation and Recovery Act programs offer the possibility of requiring the generators of the sediments to pay for removal and is already the source of funding in some locations. This approach has all the main limitation of Superfund for cleanup of land disposal sites, the difficulty of identifying and apportioning responsibility to multiple sources. At Waukegan Harbor, cleanup finally began under Superfund in part because the Outboard Marine Company was the only source.

While the substantial agreement among Great Lakes scientists that contaminated sediments pose serious risk to human health because they are a major source of continuing contamination that is accumulated by fish, the risk from onland disposal sites is more problematic. Yet some of the most active support for pollution cleanup is from the grassroots activists concerned about waste management. An overall virtual elimination strategy must determine whether limited resources would be better used to respond to the public demands for cleanup or to prevent continuing pollution from ongoing industrial activities.

The combination of rapidly increasing costs for managing hazardous wastes and the indirect consequences of the Superfund liability standard provide unexpected support for the virtual elimination goal because of the increased willingness of industry to reduce discharges. Evaluation of tradeoffs should take into account the apparent growing willingness of industry to seek
pollution prevention as awareness of economic benefits increases. Perhaps in some cases a virtual elimination strategy would achieve more by working to overcome industry reluctance to invest in process change than by trying to force overwhelming expenditure for cleanup that would accomplish less risk reduction.

One possibility to foster pollution prevention would be to use tax policy to promote investment in new technology and equipment. Some state pollution prevention programs propose to provide technology assistance to small and medium companies and the USEPA Industrial Toxics Project envisions having compliance inspections include pollution prevention assessments.

POLITICAL BARRIERS

The committee structure of Congress poses a political barrier to achieving the integrated approach to environmental management required for virtual elimination that is unlikely to be overcome anytime soon. Ideally, elimination of persistent pollutants from the ecosystem should be mandated by a single law, perhaps a Great Lakes Ecosystem Protection Act, based on a concept of a true ecosystem approach to environmental management.

Great Lakes environmental activists who have worked for current Great Lakes legislation and agency officials agree that the protective attitude of members of Congress for their committee territories was the reason that toxic air contaminants and water quality pollution of the Great Lakes were dealt with in separate legislation in 1990. Achievement of the virtual elimination goal will be more difficult because of the political barriers to integration of environmental efforts.

Just as public involvement has been essential to forcing recognition of cross-media connections in legislation, public participation must overcome another existing political barrier to virtual elimination strategy in the structure of the Remedial Action and Lakewide Management Plans. At present the process of development of these plans is going forward without enough attention to how they could be implemented.

Representatives of local government are being asked to participate in development of Remedial Action Plans (RAPs) without clear identification of their role. The lead role of the states, supposed under guidance from USEPA, is undermined by conflict between states and USEPA over how environmental management programs will be funded.

The RAPs are also being developed without consideration of how they relate to other new federal Great Lakes Initiatives. In Northwest Indiana, the multiyear comprehensive USEPA plan for aggressive multimedia enforcement actions is not integrated with development of the RAP for the Indiana Harbor and Ship Canal and the Grand Calumet River. It is not clear how innovative results of enforcement actions such as the USV consent decree will be factored into the Remedial Action Plan, emphasizing again the uncertain role of local or state governments in implementation.
The relationship between PAPs and state water quality management plans for nonpoint sources is also unclear. Confusion for local officials caused by overlap in these processes will contribute to resistance to participation in implementation of the RAPS. The confusion will be confounded unless the relationship between Lakewide Management Plans and RAPs is also clarified.

Finally, the role of the IJC in relation to the USEPA and state agencies in development of RAPS is unclear. The USEPA is the lead agency for development of both and have new statutory mandates under the Great Lakes Critical Programs Act. Yet in the Grand Calumet RAP process, the federal agency acts as an observer while the state appears to be working under the direction of staff from the IJC Great Lakes Regional Office.

Clarification of the functional relationships is essential to remove potential political barriers to implementation even if a PAP is completed on paper. Notwithstanding possible obstacles, there are potential new opportunities for reinforcing virtual elimination strategy in various ways.

TECHNOLOGY LIMITATIONS

The lack of proved cost-effective technology for removal of contaminated sediments and long term safe storage for waste residues is a major barrier to virtual elimination of toxic contaminants. Congress addressed this issue in Section 118 of the 1987 Clean Water Act amendments by directing USEPA to assess and test currently available technology in demonstration projects at five locations in the Great Lakes. Deadlines for completion of the projects and for a report to Congress on results were set in the 1990 Critical Programs Act.

If USEPA meets the deadlines, the report to Congress will be made in 1993. The agency is also directed to report on the effects of contaminated sediments on human health and the Great Lakes ecosystem by that date.

Estimates of ultimate costs of sediment removal, treatment and long term storage of residual materials by any of the technologies now being tested range up to tens of billions of dollars. For these reasons, lack of cost-effective technology for abatement of contaminated sediments is likely to remain a significant barrier to virtual elimination of contamination from these inplace sources.
Opportunities to promote virtual elimination of persistent bioaccumulative contaminants from the Great Lakes ecosystem can be found in existing environmental management programs as well as in new pollution prevention efforts. In addition, reduction of use of some substances could be accomplished in innovative ways.

Issuance of air, water and waste disposal permits offers opportunities promote pollution prevention and to avoid inter-media transfer of contaminants. One suggestion is to issue single integrated permits for facilities. This process would require both the discharger and the environmental management agencies to consider how such transfers occur, a process that would also promote attention to means of pollution prevention.

Pollution prevention could also be promoted by requiring pollution prevention planning as a condition for receiving permits. A change of philosophy would be required for issuing agencies and dischargers alike toward greater acceptance of the ultimate aim of the Clean Water Act. Instead of setting permit conditions on the basis of how much pollution could be assimilated, pollution prevention planning would require focus on ultimate elimination.

Another possibility is to shift the burden of proof in the permitting process to require that dischargers demonstrate that pollutants will not bioaccumulate in the ecosystem. Shifting the burden of risk assessment could assist in overcoming the complications and delay that now characterize many regulatory procedures. The antibacksliding and antidegradation features of the emerging federal guidance for state water quality standards in the Great Lakes are an important step toward virtual elimination because they will have the effect of shifting the burden of proof to the discharger.

Further motivation for pollution prevention could be provided by aggressive but creative enforcement actions for violation of permit conditions. The 1990 far-reaching and costly consent decree agreement between the USX Corporation and the USEPA requires not just correction of violations but also remediation of past pollution and prevention of continuing pollution.

Long term monitoring programs are required for all the company's operations at its Gary works, including the coke plant, all outfalls to the Grand Calumet River, and all waste storage and disposal operations. The company is required to develop new spill prevention and control measures and conduct an annual audit of pretreatment processes to assure that wastewaters do not exceed the capacity of the municipal sewage treatment system.

The waste management programs under Superfund and the Resource Conservation and Recovery Act also offer opportunity to force re-use and recycling of materials that must be part of
virtual elimination and pollution prevention policy. The imposition of liability for cleanup costs from past and future pollution have already provided enormous motivation to industry for pollution prevention. The agency should include recycling requirements in regulations for municipal incineration and landfill operations in order to provide similar motivation to the general public.

The bans on use of substances embodied in the zero discharge concept usually means prohibition of manufacture which is not applicable to heavy metals. It has been suggested that a ban on smelting of lead and mercury, however, would force recycling and re-use of existing supplies to reduce escape and disposal into the environment. This measure could also in time encourage substitution of other materials.

Mining of disposal sites to recover metals has also been suggested as a way to offset cleanup costs and reduce need to mine new ore supplies. Upfront separation of mercury batteries, for example, from municipal waste streams could be one way to re-use already mined metal.

All of these actions require a change in mind set as well as policies that still encourage use of virgin materials rather than re-use and recycling. The public's willingness to practice recycling has been demonstrated in cities across the country where the level of participation in municipal recycling programs has consistently exceeded expectations. A virtual elimination strategy for the Great Lakes should include public education that increases public understanding of the link between environmental and human health.

Understanding of bioaccumulation and bioconcentration are the key to understanding the link in the Great Lakes. For this reason, public education in support of virtual elimination should concentrate on increasing understanding of ecological processes and man's place in the Great Lakes ecosystem. In light of the strong and growing public support for protection of the Great Lakes, increased ecological awareness will increase the political will for virtual elimination of toxic contaminants on which ultimate success depends.
SUMMARY ANSWERS TO QUESTIONS CONCERNING VIRTUAL ELIMINATION

1. What legal basis exists specifically to virtually eliminate input of persistent toxic substances?

The bans on manufacture and use of DDT, polychlorinated biphenyls (PCBs) and toxaphene are the chief examples of legislation intended to eliminate use of specific persistent toxic substances. Although lead does not bioconcentrate in the same way, it is a heavy metal that accumulates to dangerous levels in the environment and whose use has been banned for certain purposes. Use of lead in gasoline was reduced and then eliminated under the Clean Air Act. Use in interior paints was banned first by local legislation and later in national laws. All of the pesticide bans came about essentially because of recognition of their role in the Great Lakes ecosystem but in different ways.

The national ban on DDT followed bans by Great Lakes states. PCBs were the only class of chemicals specifically banned in the 1976 Toxic Substances Control Act which established a generally unsuccessful system to identify and ban other chemicals too dangerous to use. Toxaphene was banned when a powerful Congress-man seized opportunity to attach an amendment to an appropriation bill in 1982 in response to constituent concerns.

Especially for DDT and PCBs, the bans have failed to eliminate the persistent substances from the ecosystem to date. For DDT, manufacture and export to other countries has apparently continued to allow inputs to the Great Lakes ecosystem by long range transport and atmospheric deposition. For PCBs, high residual concentrations and failure to eliminate all uses have resulted in continuing inputs from many sources.

The regulations for PCBs allowed continued use in so-called closed systems such as transformers. Experience showed that the transformers allowed continued volatilization of PCBs into the atmosphere. They also continue to be released by accidents and explosions.

The widespread use of PCBs in small quantities in electric capacitors meant, for example, that all electric motors manufactured before 1976 contained PCBs. The EPA regulations allowed continued use of television sets, appliances and fluorescent light fixtures that ultimately are disposed of in municipal waste systems. These and other sources continue to allow inputs of PCBs into the ecosystem from incinerators and landfills.

These experiences have demonstrated the difficulty of eliminating persistent toxic substances from the environment after they have been widely used and confirmed the necessity of establishing ways to identify in advance those chemicals whose use should not be allowed. Criteria should be developed for identifying substances whose use should be eliminated but TSCA should also be used to prevent catastrophe by advance identification.
The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) offers other opportunities to identify persistent bioaccumulative chemicals before they are registered for use. This law also gives USEPA authority to ban such substances already in use but the agency has been failed to carry out necessary evaluations and tests except in a few cases.

2. What opportunities exist within the present regulatory framework for virtual elimination of persistent toxic substances?

The goal of restoration of ecological integrity and the antidegradation and antibacksliding provisions of the Clean Water Act all support the virtual elimination of persistent toxic substances although they have not been used consistently for this purpose in past regulatory application. The problem has been that persistent toxic substances were regulated on the same basis as conventional pollutants, that is, as if the environment has an assimilative capacity that would allow in effect safe dilution of small amounts of contaminants.

The new federal guidance now being developed to obtain consistency among state water quality standards will include explicit, innovative requirements to prevent backsliding and antidegradation. With consistency, states should be more willing to apply antidegradation aggressively because they will be less vulnerable to industry threats to move operations to another location.

Another problem has been the way that administration of clean-up efforts under pollution control laws allowed shifting of pollutants from one environmental medium to another. Thus end of pipe controls under the Clean Water Act and emission controls under the Clean Air Act led to creation of more wastes to be disposed of on land from where contaminants could return to air or water. Although contradictions between laws still exist, EPA now has pledged to seek to avoid such intermedia transfer within the present regulatory framework.

In the past, enforcement actions were taken separately under separate laws and resulting cleanup actions concerned only one medium. At present in Northwest Indiana all program divisions of the Region V office of EPA are working together on enforcement actions aimed at remediation of existing pollution and prevention of future pollution. The Superfund program, for example, is investigating whether Superfund funds could be used to assist remediation of contaminated sediments in the Indiana Harbor and Ship Canal.

The original scoring system by which priority was established for cleanup under Superfund gave so much weight to groundwater protection that Great Lakes sites had little chance to be included. The scoring system has now been revised to give more weight to protection of ecologically sensitive waters as well as groundwater. EPA is seeking to identify potentially
responsible parties for the Indiana Harbor and Ship Canal in the event that this location becomes a priority Superfund site.

Consideration is also being given to whether the Corps of Engineers should assume cleanup responsibility in light of the urgent need for dredging for navigation purposes. The agency is also using Toxics Release Inventory data under Superfund and tracking and liability authorities under the Resource Conservation and Recovery Act (RCRA) to support remediation efforts in this Area of Concern.

In summary, there appears to be a new willingness at EPA to search for innovative ways to use existing regulatory authorities for remediation, offering new promise for assisting virtual elimination of persistent toxic substances from the environment.

3. What are gaps in the present regulatory framework?

Scientific agreement that contaminated sediments are a major source of ongoing inputs of persistent toxic contaminants is the reason that the 1987 Clean Water Act called for demonstration cleanup projects in five Areas of Concern. The high cost of cleanup as well as lack of proved technology for remediation of contaminated sediments hinder cleanup. The need for criteria to compel cleanup and provide funding for contaminated sediments should be addressed in re-authorization of the Clean Water Act.

Inadequate attention to runoff of agricultural pesticides is another gap. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) does not provide for enforcement against overuse that leads to excessive runoff. Nor has this problem been addressed adequately through non-regulatory means such as education of users in concert with agriculture agencies.

EPA has used existing authority to restrict or ban use of pesticides only to protect human health and then reluctantly. EPA FIFRA authority extends to protection of the environment as well as human health. EPA should direct attention to pollution prevention in agricultural pesticide use as well as industrial point sources in its employment of the Great Lakes to demonstrate its announced policy to seek preservation of ecological integrity. Thus the agency should develop criteria that factor human exposure through bioaccumulation and fish consumption and effects on wildlife into regulation of pesticides.

A major gap in regulatory protection of groundwater is the lack of control of deep well injection of liquid wastes and the lack of monitoring requirements for leaks and spills on site for both nonpersistent and persistent substances. Lack of regulation means that there is also a lack of information about effects of deep well injection on groundwater, including where there appears to be potential for leaching through groundwater to the Great Lakes near drinking water intakes.

Large quantities of wastes are being disposed of by this
means by steel industries on the south shore of Lake Michigan. In two recent instances in the same area substantial accumulations of toxic contaminants have been discovered due to past industrial operations. In one case, groundwater contamination resulting from past spills and leaks was discovered on and beyond the site of a chemical company after lethal effects on vegetation on the banks of a Lake Michigan tributary were noticed. In another case, a huge pool of several million gallons of oil has been discovered under and beyond a large refinery site where it almost certainly leaches into Lake Michigan.

The largest gap in the existing framework is the lack of a legislative mandate for consideration of cross-media relationships in pollution control. Also, recent pollution prevention legislation may need to be expanded to include regulation beyond the present reliance on voluntary efforts.

4. What new legislative and regulatory directions are required?

As stated above, there is an urgent need for legislation that requires consideration of cross-media effects in all aspects of pollution control, including development of regulations. All experienced professional workers in environmental protection recognize how cross-media effects resulted from existing laws.

The Clean Air Act and the Clean Water Act resulted in concentration of heavy metals and other contaminants into sludges that were disposed of on land or incinerated to release persistent substances into the atmosphere for dispersion. It could be argued that these laws created some of the land disposal methods that led to adoption of RCRA and Superfund.

Recognition that some pollution control measures have created even more difficult problems has led to the current emphasis on the need for pollution prevention, which should be addressed in future re-authorization of the old laws. Building on the concepts of the National Environmental Policy Act (NEPA), perhaps a new Ecosystem Protection Act should seek to assure preservation of ecological integrity by requiring analysis of cross-media transfers and the ultimate fate of pollutants in all pollution control measures.

Under such a law, the burden of proof should be placed on industry about the ecological effects of wastes and products. In other words, the pollution prevention principle of TSCA, that capacity for persistent, accumulative environmental harm should be evaluated in advance, should be applied. Criteria to prevent use of substances that will cause reproductive failure or birth defects should be developed. Results of analysis should be required to be displayed in product labels for purposes of future liability. Provision of this information will allow society to decide the risks to be assumed in product use.

The need for better enforcement of pre-treatment regulation should be considered in re-authorization of the Clean Water Act.
with or without a new ecosystem protection law. Operators of municipal treatment systems report lack of pre-treatment compliance especially by small and medium-sized facilities. Pre-treatment is needed to prevent problems with industrial wastes in discharges from publicly owned treatment systems. It could even allow more options for sludge disposal by eliminating industrial contaminants. In turn, stricter pre-treatment requirements could provide additional motivation to industry for pollution prevention.

Another problem is the long lag time between updating of Best Available Treatment (BAT) guidelines on which pretreatment and direct discharge permit requirements depend. State agency staff suggest that the guidelines should be updated at least every 10 years to incorporate new developments in industrial process modification and product substitution as well as re-use and recycling requirements.

Analysis of ecological effects should include long term costs for waste handling and potential opportunities for future recovery for re-use. Requirements that heavy metals be disposed of in ways that would allow future recovery should be considered in RCRA re-authorization.

A ban on smelting of new ore should also be considered for some metals such as mercury and lead. Such a ban would force recovery and re-use efforts and influence disposal methods.

5. Does the present framework facilitate an integrated multi-media approach?

The current regulatory framework does not facilitate cross-media management well. Under an integrated management approach, it is unlikely that the new Air Quality Agreement between Canada and the United States would have been developed separately from the existing Great Lakes Water Quality Agreement.

The best examples of successful waste reduction result from private industrial efforts. Although it could be argued that the need to initiate such efforts have been motivated by high costs resulting from present regulation, this was incidental rather than the aim of existing laws.

Waste reduction can be achieved when environmental criteria are applied in design of facilities and production processes. For example, in 1980 the Eli Lilly Company reported that the waste stream was reduced from 75 percent to less than 10 percent when a new facility was built to achieve the maximum water and energy conservation with no offsite disposal of organic wastes.

The many successes of the 3-M Company to reduce wastes are well known and today many companies including the Dow Chemical Company and Monsanto are undertaking new initiatives, even, some say, to achieve zero discharge. Experience may demonstrate a need for regulatory standards in the future that deliberately seek to
motivate pollution prevention efforts.

Meanwhile, there is a problem in that such efforts are often more possible for large companies individually than for small companies that collectively produce much of the contamination. In Minneapolis and in Illinois collective waste treatment systems have been established for small electroplating companies. Government help with technical assistance and to facilitate capital investment in new equipment and processes is especially needed to support and encourage pollution prevention for small and medium-sized enterprises.

Tax credits, loan programs and other forms of assistance may even be justified for larger companies because of the potential economic development benefits.

6. What are the barriers to development and application of a necessary and sufficient regulatory framework?

As suggested above, the regulatory framework could be used to encourage development of pollution prevention measures outside regulatory processes but there are major barriers to change in both arenas. One of the major barriers to regulatory reform to facilitate a cross-media approach is the organization structure of Congress. At present it is much more difficult to develop legislation that cuts across media boundaries because such legislation has to be referred to more than one committee.

Committee chairmen are notoriously zealous in protection of their legislative territories but committee staffs lack expertise beyond committee jurisdictions. This is a political problem, with the difficulty of forcing Congressional re-organization unlikely to be overcome soon.

Another problem is the contradiction between the current effort to lay more responsibility for environmental management on the states and the need for federal leadership in bringing about reform in the current regulatory framework with an ecosystem approach to management. Early environmental laws in the 1970s sought a federal-state partnership where the states were provided federal funding to carry out federally mandated programs.

There is resentment by the states of the trend in the 1980s to expand federal requirements at the same time that federal resources were reduced. This trend has also reduced the capacity of the states to try new approaches outside federal mandates by forcing use of more state resources for the federal purposes.

Federal leadership is essential for development of new ecosystem approaches to management not only because states lack resources but also because so many environmental problems cross jurisdictional lines. Fish do not recognize state lines in the Great Lakes and toxic air pollutants do not respect national, provincial or state boundaries in the atmosphere.
of liability for cleanup costs under Superfund are already stimulating pollution prevention efforts. Pollution prevention measures may also make industry more competitive in the world market through increased efficiency and productivity.

The Inland Steel Company has announced its intention to change its coke production processes to prevent release of deadly gasses into the atmosphere and to protect workers from exposure inside the plant. Many experts inside and outside the steel industry believe that the U.S. industry would have remained more competitive in the world market if it had updated production processes, with increased pollution control and prevention as well as efficiency, in previous decades.

Several years ago the Wall Street Journal pointed out that the Japanese industry had flourished under much stricter regulations than required by U.S. law. The Japanese industry was forced to re-build after World War II, while the U.S. industry failed to modernize. West Germany is now committed to helping East German industry adopt advanced technology, for example, and other countries are seeking to modernize as well. The experience in Japan and Europe suggests that USEPA need not be so reluctant to force change that will bring both economic and environmental benefits through pollution control and prevention.
ATTACHMENT 1: CONTACTS

Ralph Bauer, Deputy Administrator, Region V, USEPA
Dale Bryson, Water Division, Region V, USEPA
David Kee, Air and Radiation Division, Region V, USEPA
Chris Grundler, Director, Great Lakes National Program Office, USEPA
Robert Tolpa, Water Compliance Branch, Region V, USEPA
Joan Karnauskas, Permits Section, Region V, USEPA
Linda Glass, Pollution Prevention, Region V, USEPA
Milton Clark, Risk Assessment Office, Region V, USEPA
Bonnie Eldred, Project Director, Sheboygan Sediments, Region V, USEPA
David Rankin, Pretreatment Coordinator, Region V, USEPA
Howard Zar, Science Advisor, Water Division, Region V, USEPA
David Fege, Office of Pollution Prevention, USEPA Headquarters
Del Rector, Michigan Department of Natural Resources
Richard Powers, Michigan Department of Natural Resources
Lyman Wible, Wisconsin Department of Natural Resources
Bruce Baker, Wisconsin Department of Natural Resources
Salvatore Pagano, New York Department of Environmental Conservation
David Nelson, Indiana Department of Environmental Management
James Park, Illinois Environmental Protection Agency
Michael Hays, Illinois Environmental Protection Agency
David Thomas, Illinois Department of Energy and Natural Resources
John Shaeffer, Illinois Water Survey
Bonnie Sims, Minnesota Pollution Control Agency
Bruce Scherkenback, Minnesota Pollution Control Agency
Jack Weinberg, Great Lakes Program, Greenpeace
Robert Ginsberg, Ph.D., Consultant to Greenpeace
Glenda Daniel, Lake Michigan Federation
Phil Weller, Great Lakes United
Sue Greer, People Against Hazardous Landfill Sites
Larry Davis, People Against Hazardous Landfill Sites
Jeffry Stant, Hoosier Environmental Council
Jane Elder, Midwest Office, Sierra Club
William Davis, Citizens for a Better Environment
Kevin Green, Citizens for a Better Environment
Jane Dustin, Indiana Izaak Walton League
Doreen Carey, Grand Calumet Task Force
Paul Connell, Lawrence University
Mark Van Putten, Great Lakes Natural Resources Center, National Wildlife Federation
William Beranek, Indiana Environmental Institute
Jean Hennessy, Dartmouth College
Barry Boyer, University of New York at Buffalo
William Lukens, Michigan Coalition for Clean Water
ATTACHMENT 2: LEGAL AUTHORITIES FOR VIRTUAL ELIMINATION

FEDERAL LAWS

CLEAN WATER ACT (PL 92-500, Federal Water Pollution Control Act as Amended by 100-4, 1987)

Policy Goal: Section 101 (33 USC 31251 (a) (1)

Anti-degradation Policy: Sections 101(a)(2) and 303(c) (40 CFR 131.12(a)

Anti-backsliding Policy: Section 302(a) (33 USC 1342 (O)

Total Maximum Daily Loads: Section 304(a)(2) (33 USC 1313(d)(1)(c)

Toxics Effluent Limitations: Section 405 (40 USC 129)

Incorporation of Great Lakes Agreement objectives: Section 118(a)

Effluent Limitations: (33 USC 1311, 1317(a),13314(c)

Water Quality Criteria: Section 304 (a)(1) 33 USC 1314(a)(1)

CLEAN AIR ACT (PL 84-159, as amended by PL 101-952, October 26, 1990)

Prevention of Significant Deterioration: Section 7470

Non-attainment Zones: Section 102

Toxic Emissions from Mobile Sources: Section 206

Hazardous Air Pollutants: Section 301 of PL 101-952) (Section 112 in earlier, Section 304

RESOURCE CONSERVATION AND RECOVERY ACT (PL 94-580 as amended by PL 99-499, 1988)

Landfill Bans: (42 USC 6924(d) (g) (j) (m)

Strict Liability:

Also (42 6922(6), 6925 (h)

TOXIC SUBSTANCES CONTROL ACT (PL 94-469, as amended by PL 99-519, 1986)

Administrator's Authority To Ban: (15 usc 2605(a)

Ban on PCBs: (15 usc 2605 (e)

FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT (PL 92-516, as amended by PL 98-620, 1984)

Cancellation/Suspension of Registration: 7 USC 136(d), 136(k)

Liability, Section 107

RESOURCE CONSERVATION AND RECOVERY ACT (PL 94-580, as amended by PL 99-499, 1986)

Listing, Section 6921
Upgrading of Open Dumps, Section 6945
ATTACHMENT 3: DOCUMENT SOURCES

1. Region V FY 1991 Great Lakes Workplan
   Air and Radiation Division
   Water Division
   Waste Management Division
   Environmental Sciences Division
   Planning and Management Division
   Office of Regional Counsel
   Multi-Media Proposals

2. Region V Risk Reduction Strategy

   Executive Summary
   Report of the Strategic Options Subcommittee
   Report of the Ecology and Welfare Subcommittee
   Report of the Human Health Subcommittee

4. FY 1991 Five Year Strategic Plan for the Great Lakes, USEPA

5. Reports and Draft Criteria Proposals, Great Lakes Water Quality Initiative, including Statement of Antidegradation Policy, to February, 1991


7. A Prescription for Healthy Great Lakes, report of a joint Project of the National Wildlife Federation and the Canadian Institute for Environmental Law and Policy

8. Statement of Principles, Zero Discharge Alliance


15. Title 35: Environmental Protection, Subtitle C: Water
Memorandum

To: Commissioners

From: James G. Chandler and Michael J. Wachsler

Subject: Summary of Ideas Discussed at the April 11-12, 1991 Roundtable on the Achievement of Zero Discharge Through Legislation and Regulation

We have reviewed our notes of the April 11-12, 1991, IJC Roundtable on the Achievement of Zero Discharge Through Legislation and Regulation and have prepared the following summary of ideas discussed at the Roundtable that the Commissioners may wish to keep in mind, consider and/or follow up on at a later date. We have tried to group the ideas by subject matter rather than track the conversation as it evolved. Please note that this is a collection of ideas expressed by participants and is not intended to suggest a consensus. A list of participants is found at Annex I.

Working Assumptions

Consistent with the Background Paper to the Roundtable (attached as Annex II), discussion focused on the Great Lakes Water Quality Agreement's goals of virtually eliminating the input of persistent toxic substances using the philosophy of zero discharge. Although there are different views about what zero discharge means, for the purposes of the Roundtable, zero discharge was regarded as a step on the way to virtual elimination.

Given the nature of persistent toxic substances coupled with the above noted goals, the concepts of "assimilative capacity" and the reduction of persistent toxic substances to "acceptable levels" were viewed as inappropriate.

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Current Laws (Canada)

Although legal mechanisms exist for banning substances in Canada and in Ontario, at present there are no effective total bans of toxics in Canada or in Ontario.

The Canadian Environmental Protection Act (CEPA) does provide Ministers with authority to ban chemicals and to regulate them from cradle to grave, but this very broad authority has not been used often. CEPA allows for a multimedia approach and offers the possibility of consistency among provincial jurisdictions that would be more difficult to obtain through action at the provincial level. However, only nine substances have been regulated under CEPA and CEPA does not adopt the philosophy of zero discharge. The CEPA requirement for federal-provincial consultation is also an obstacle to its effective application. CEPA is enforced mainly at the provincial level and there is no provision for private remedies.

Pursuant to the Ontario Environmental Protection Act, the Ontario Government has adopted the Municipal-Industrial Strategy for Abatement (MISA). The Strategy mimics the approach of the U.S. Clean Water Act and provides for regulation on an industry by industry basis. Under MISA, industries must identify what they discharge. However, the decision about what is to be monitored is negotiated by Government and industry. The Government then establishes discharge limits based on the information which has been provided. MISA is technology based but it adopts the philosophy of zero discharge which would be its long term goal.

The Ontario Environmental Protection Act can also be used to address certain classes of activities or products. For example, it has been used to ban ozone depleting substances.

The Ontario Pesticide Act has been used to prohibit the use of DDT.

Current Laws (U.S.A.)

There are also no effective bans of toxic substances in the United States.

The U.S. Clean Water Act establishes water quality criteria and adopts the philosophy of zero discharge. However, permits issued under the Act are based on maximum acceptable limits. These limits are set on the basis of the more stringent of available technology or acceptable water concentrations, but the system fails because end of pipe concentrations may be below detectable levels. In addition it does not address the build up
The accumulation of loadings of persistent toxics, i.e. it does not take account of the total load from all sources. However, there is authority to establish total maximum daily loads (TMDLS) for specific waterbodies/watersheds.

The U.S. Clean Water Act does not adopt a multimedia approach and does not address the lifecycle of chemicals but it does have the potential to address non-point sources and best management practices.

The U.S. tried to establish a nationwide system by means of the Clean Water Act but, by delegating implementation of the Act to states, has ended up with a patchwork.

The Toxic Substances Control Act (TSCA) provided for notification of new substances and establishes authority to ban and regulate chemicals and processes if they constitute an unreasonable risk. It also establishes a legislative ban for certain specified substances. TSCA provides authority to control a substance anywhere in its life cycle and could be used for "phase-outs". In practice, TSCA has failed except in very targeted situations, such as the use of chromium in cooling towers. Its failure results from lack of enforcement and inherent problems in the legislation such as the difficulty of establishing "unreasonable risk" and the length of time (up to 3 to 4 years) to establish rules.

When TSCA was enacted there was not a consensus for banning chemicals and the legislation, for the most part, left that decision to be made later by regulations. TSCA did reflect the political consensus, state of knowledge and science at the time it was enacted and also some naivety. It has been made obsolete by the fact that it is now known there will never be scientific certainty about the risk substances pose.

The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) is very focused and cannot be used for general bans. Like TSCA, it has not adequately screened substances because of inherent problems in the legislation and because of lack of enforcement. TSCA and FIFRA are implemented mainly at the federal level.

The U.S. Clean Air Act established an overall limit within a specific area which companies in that area can achieve, among other things, by trading emission limits with each other.

Federal legislation in the U.S. creates a level playing field nationally.

In the United States, local bans may contravene the Constitutional prohibition against restrictions on the freedom of interstate commerce. Federal regional approaches such as the
Medical Waste Tracking Act which is a pilot project under the Resource Conservation and Recovery Act (RCRA) might be effective.

Need for Social Consensus

The degree of social consensus will largely determine the type and effectiveness of environmental laws, regulations and policies that are in place at a given time. Currently, there is not a consensus to ban any substance totally. (Even DDT may be used under certain circumstances.) Thus, while mechanisms exist to ban substances in Canada and in the United States, the will to use those mechanisms has been lacking. In the absence of a clear social consensus on the threshold for action, politicians have left it to bureaucrats to decide which substances are to be regulated. In this situation, users of persistent toxic substances have been able to exert political pressure and rely on the complexities of statute provisions to avoid regulation.

Laws reflect a range of social values and costs. It is therefore necessary to look not only at substances but at the related social values and to allow time (perhaps using interim measures) for those social values to work themselves out in the development of alternatives. Otherwise bans are not realistic. If there are no alternatives, governments will not be inclined to ban a substance.

Legislative and Regulatory Approaches Designed to Achieve Zero Discharge

Bans (Legislation v. Regulation)

During the Roundtable the term "ban" was used to include the phasing out of substances, processes, etc. A "phase out" may be the best solution, i.e. bans should be achieved through implementation of "sunsetting" procedures that require a ban by a certain date. This is different from requiring reduction to acceptable levels.

Because of the difficulty of establishing that a particular substance poses an unreasonable risk, legislation should perhaps be formulated in a way that does not require determination of risk i.e. there should simply be a list of substances which have been determined to be subject to ban/phase-out and for which there is no need to establish risk. In the case of sunsetting, legislation/regulation should provide a specific list of substances and say specifically what is to be done within a stated phase-out time-frame.

To be enforceable legislation must be definite. It was suggested that high priced permits may be a way to achieve a phase out. It was also said that criminal legislation does not
work because it is time consuming, costly and the burden of proof is very difficult to meet.

While recognizing that a legislative basis is needed for all enforceable bans and phase-outs, there is need to consider whether specific ban/phase-outs should be effected by means of legislation or regulation. In the absence of social consensus, politicians will be unwilling to make a clear statement in legislation and will tend to pass the issue to the bureaucrats; i.e. enact legislation which leaves it to the bureaucrats to produce regulations banning/phasing out specific substances, processes, products. On the other hand, once legislation is enacted it tends to be inflexible and difficult to change. Legislation and formal rule making can be equally long processes.

Regardless of whether the list of substances which is subject to ban/phase out is established directly by legislation or through regulation, a process of legislative or administrative review is needed. The success of this process, like the initial process depends on political will.

The IJC has a list of persistent toxic substances requiring priority action which was drawn up by the Water Quality Board in 1985. The Governments are also required to produce lists specified in the GLWQA. However, none of these lists is targeted towards stringent action.

In order to be implemented a list of substances to be banned/phased out must be legitimized through a process such as a hearing which will make it easier for people to buy into the ban/phase out. There is not a social consensus at present to ban many substances and it may be difficult to build public consensus for sixty chemicals.

Consensus Building Process

New legislative and regulatory developments have to be achieved on the basis of consensus derived from consultative processes which involve a broad spectrum of public participation. The consensus must involve industry as well as the environmental community. Furthermore, it is necessary to recognize the role of the media and education in building the consensus which is essential to the passage of legislation.

An example of consensus building is provided by the Coalition of Northeast Governors who assembled industrialists, environmentalists and officials to look at reductions in packaging and who came up with model legislation for the state level. This legislation has now been enacted in six Northeastern and in two other states. The next step will be to turn this into a national measure and thus create a level playing field within
the United States. The Governors began this process by meeting with CEO's of the firms concerned and by offering uniform legislation. Structures were then established for cooperation and consultation in policy and technical areas including fact finding. The proposals which emerged from this process passed into law without change. The entire process took one year.

The Burden of Proof

Legislation should state clearly where the burden of proof lies in terms of risk. Is it on loss of economic benefits or health? In theory it is usually cast in terms of health, but in reality is often set in terms of economic risk. It is necessary to decide whether to be conservative on the side of the economy or health. In Canada, the Charter creates a major obstacle to the use of the reverse onus concept, although it is always possible to use the "notwithstanding" clause, thus avoiding the Charter requirements.

Focus of Legislation/Regulation

Focusing exclusively on the substances which come out the end of pipes limits the issue to counting molecules and introduces the problem of detectability. Instead attention should be directed upstream from discharge pipes and consideration given to how processes, materials and end products can be changed to achieve zero discharge. Pollution prevention requires consideration of why products are being produced as well as the processes and materials used. Even with zero discharge to water and air there may still be materials at a site which could escape. There is a need to address the issue at its source not just at the point of discharge.

Air and non-point sources provide another reason why pollution prevention cannot be restricted to the end of pipes. Furthermore measures need to be multimedia in scope because otherwise prohibitions on emissions from pipes may lead to greater emissions from smokestacks.

Scope of Legislation/Regulation

In view of the multinational nature of sources and of economic competition it is difficult to do anything exclusively within one region, or even one or two countries. Zero discharge requires global measures. However, it is important to recognize that the Great Lakes need action now and cannot wait for global action. It is easier and quicker to obtain a consensus for legislation in one or a few jurisdictions in a region than to obtain a national consensus. Regional legislation can serve as a
catalyst for broader legislation and action. The Great Lakes region is a particularly suitable starting place because it has an institutional framework in terms of the Great Lakes Water Quality Agreement, as well as other arrangements and networks which provide a basis for action. In the Great Lakes region you would always need Ontario plus the eight Great Lakes states. National consensus would have to follow quickly to avoid the possibility of pollution havens.

In Canada, enacting legislation at a local level also avoids the constitutional issue of whether Canada (the Federal Government) has competence. However, Federal legislation, being national in character, is a step closer to the ultimate goal of international action. One option might be to have umbrella national legislation that allows some provinces and states to opt in later.

Regions will not agree to put themselves at a competitive disadvantage to other regions and there is therefore a need to pay careful attention to economics and to consider incentives and tax credits to achieve the consensus needed to enact bans/phase outs.

Legislation for Lake Superior would be inequitable unless there is some mechanism that transfers the cost of the ban/phase out to the entire industry, or a tax credit that transfers these costs to society as a whole. This could then pave the way for a broader ban.

**Market Based Approaches**

There is a need to provide for assistance in developing substitutes and other measures to obtain the social consensus needed for a ban/phase out. These could include:

- economic incentives
- tax credits
- subsidies
- market based incentives
- trading rights
- compensation for bans.

Some said that it is wrong to pay people not to pollute. Others suggested that this is not offensive if people are being encouraged to change activities which were not previously considered illegal.
Actions in the U.S. to implement the Montreal Protocol for the reduction of CFC's provide one example of a market based approach. Limits were placed on the total amount of CFC's permitted with allowances issued to each producer and importer. Allowances could be traded thus encouraging the most cost effective approach to the reduced used of CFC's. Lawsuits were successfully brought against several importers who imported CFC's without the required allowances.

STRATEGY

A strategy for achieving zero discharge of persistent toxic substances should include:

(1) DEVELOPMENT AND ENACTMENT OF A "MODEL LAW" (outlined in Annex III)

(2) A PHASE-OUT OF DESIGNATED SUBSTANCES

(3) A BAN OF 5 TO 7 SUBSTANCES NOW

(4) SETTING SUNSET DATES FOR THE SUBSTANCES TO BE PHASED OUT

(5) EMBODYING THE STRATEGY IN A TREATY

Governments want to know the impact of a ban before they impose it. It is therefore necessary to identify sources, and determine and encourage substitutes so as to avoid difficulties. The last 5% of a substance is always the most expensive to remove.

It will take a great deal of work and time to achieve a consensus to ban the 11 chemicals on the Water Quality Board's list. It cannot be expected to do this every 3 or 4 years. However, if 4 or 5 substances can be successfully banned, it will be easier to ban others.

Some said that the situation is too complex for a single model and that there is need for an agency with discretion to negotiate bans\phase outs with individual industries.

It was also suggested that the current legal system does not lend itself to banning substances in a logical way. We are trying to make older laws, which are designed to limit or reduce discharges, fit the new problem of toxic substances. Thus, the experience with phosphorus may not be directly relevant to persistent toxic substances. The phosphorus problem (e.g. in Lake Erie) was visible and relatively simple and cheap to handle. Persistent toxic substances are pervasive and technically
List of Participants at the IJC Roundtable on the Achievement of Zero Discharge Through Legislation and Regulation

Washington, D.C., April 11-12, 1991

Mr. Nabil Antaki
International Arbitration
Institute of Quebec
500 Grande Allee East
Quebec City, Quebec G1R 2J7
(418) 649-1374

Mr. Michael W. Bader
Barrister and Solicitor
Aird & Berlis
145 King St. West, 15th Floor
Toronto, Ontario
M5H 2J3
(416) 364-1241

Ms. Allegra Cangelosi
Office of Senator Glenn
United States Senate
503 Hart Senate Office Building
Washington, D.C. 20510-3501
(202) 224-3353

Dr. Jeffrey A. Foran
Division of Occupational and Environmental Medicine
George Washington University
2150 Pennsylvania Avenue, N.W.
Washington, D.C. 20037
(202) 994-2587

Dr. Isobel Heathcoate
35 Firstbrooke Road
Toronto, Ontario
M4H 2L2
(416) 978-4144

Ms. Frances H. Irwin
Senior Associate
The Conservation Foundation
1250 Twenty-Fourth Street, N.W.
Washington, D.C. 20037
(202) 778-9646

Ms. Ann Jarrell
George Washington University
Washington, D.C.
The International Joint Commission is a permanent binational body created by the 1909 Boundary Waters Treaty between Canada and the United States to carry out certain regulatory and advisory functions. The Commission is composed of six (6) Commissioners, three of whom are appointed by the Governor General in Council of Canada and three by the President of the United States. The Commission was asked in the 1972 Great Lakes Water Quality Agreement and in subsequent revisions of that Agreement, to advise the federal, state and provincial governments about restoring and maintaining the quality of the waters of the Great Lakes Basin Ecosystem. Since 1978, the successor Agreement has explicitly adopted an ecosystem approach, which the Commission has interpreted as including any factors that influence or are affected by Great Lakes water quality. A broad range of technical and policy issues are therefore
considered pertinent to the Commission's consideration of matters under the Great Lakes Water Quality Agreement. At the Biennial Meeting of the International Joint Commission on Great Lakes water quality in October 1989, the Commission announced that it intended to create a series of Roundtables to bring together knowledgeable individuals who could provide a wide range of views on questions or issues pertinent to the Great Lakes Water Quality Agreement and the advice which the Commission is asked to provide to governments under the Agreement.

The Roundtable on the Achievement of Zero Discharge through Legislation and Regulation will probably involve fewer than 20 participants, including the six (6) Commissioners and a facilitator. Provision will be made for a small gallery of observers made up of advisers to the Commission. The Roundtable will not be open to the public.

The Great Lakes Water Quality Agreement states that the philosophy of zero discharge shall be adopted for the control of inputs of persistent toxic substances. To assist it in
formulating advice and recommendations to governments on this issue, the Commission held a Roundtable on "Developing a Strategy to Achieve Zero Discharge in the Great Lakes" in July, 1990.

This Roundtable tended to focus on Lake Superior and a recommendation in the 5th biennial report which stated that "the Commission therefore recommends the Parties designate Lake Superior as a demonstration area where no point source discharge of any persistent toxic substance will be permitted." A second Roundtable on this topic is planned for May 1991. In preparation for the May 1991 Roundtable, and to clarify issues raised at the July 1990 Roundtable, the Commission in February 1991 held a Roundtable on how technology can contribute to achieving zero discharge and will hold a Roundtable on Legislative and Regulatory Approaches which is planned for April 11 and 12, 1991.

A paper is attached which sets out the issues which Commissioners wish to hear addressed at the Roundtable on the Achievement of Zero discharge through Legislation and Regulation.

The previous Roundtables spent considerable time discussing
what is meant by "zero" discharge. In order to avoid a
repetition of this discussion, the Commissioners have decided
that for the purposes of the Roundtable on Legislation and
Regulation "zero discharge" means a total absence of discharges.
Furthermore, while it will be necessary in the future to address
sources of persistent toxic substances coming (for example by
air) from jurisdictions outside the Great Lakes Basin, the
Commission intends at this time to focus attention to the extent
practicable on point sources within the Basin. This includes
industrial discharge to air or water and municipal sewage
treatment plants (pretreatment), but does not include releases
during transportation or releases from natural deposits or
sources or from storage or disposal facilities, e.g., landfills.
Nevertheless, measures such as storage or transportation out of
the Basin should not be viewed as acceptable ways of achieving
zero discharge.
ISSUES TO BE ADDRESSED BY THE APRIL 11-12 ROUNDTABLE

I. Are there any effective total bans on the discharge of persistent toxic substances in either the U.S. or Canada? Are there any such bans elsewhere in the world? Persistent toxic substances are defined in the Great Lakes Water Quality Agreement to mean any toxic substance with a half-life in water of greater than eight weeks. A "toxic substance" is a substance which can cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological or reproductive malfunctions or physical deformities in any organism or its offspring - or which can become poisonous after concentration in the food chain or in combination with other substances.

Of particular interest at this time are the eleven substances which were identified by the Commission's Water Quality Board in 1985 as deserving special attention. These are:
Total polychlorinated biphenyls (PCB)

Mirex

Hexachlorobenzene

Dieldrin

DDT and metabolites

2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)

2,3,7,8-tetrachlorodibenzofuran (2,3,7,8-TCDF)

Benzo-a-pyrene

Alkylated lead

Toxaphene

Mercury

Please bring examples of effective bans to the Roundtable. The Commissioners would appreciate learning of them along with a description of the legal techniques employed. In other words, what legal approaches to achieving zero discharges have worked? What monitoring approaches or other analytical techniques have been used to show that they work?
II. If there are no effective bans, are there any laws and/or regulations in place in the United States or Canada that could be used to achieve this goal of zero discharge? Please bring examples to the Roundtable.

How close have the laws and/or regulations come to banning the discharge of persistent toxic substances? Are there general bans with provision for exceptions on a case by case basis?

Why have they not been completely effective? Is it for legal, policy, or other reasons?

How would we know if or when the approach was completely effective?

III. Assuming there are no effective bans on the discharge of persistent toxic substances presently in force, what are useful alternative legal approaches to achieving this goal? e.g.,

- banning specific inputs to industrial processes;
- banning specific outputs from industrial processes;
- banning specific industrial processes;
- requiring specific industrial processes;
- banning selected uses of specific substances or products;
- implementing a sunset process.

Please bring specific suggestions to the Roundtable.

IV. What contribution can uniform or model statutes or approaches among all jurisdictions in the Great Lakes Basin make toward achieving the goal of zero discharge of persistent toxic substances? Is there an opportune time to consider this approach?

V. What is a good way to keep track of legislative and regulatory initiatives in the various jurisdictions? Would a formal governmental network be useful? Should this be limited to jurisdictions in the Great Lakes Basin or even on the North American continent?
OUTLINE OF MODEL LAW

PREAMBLE
- CLEAN-UP OF THE GREAT LAKES
- POLLUTION PREVENTION
- VIRTUAL ELIMINATION OF PERSISTENT TOXIC SUBSTANCES
  - ENCOURAGE SAFE ALTERNATIVES FOR PROCESSES, PRODUCTS, SUBSTANCES
- UNIFORMITY

SUBSTANTIVE ENACTMENTS

1. - A LIST OF SUBSTANCES TO BAN WITH PHASE OUT SCHEDULES AND ULTIMATE GOAL OF ZERO DISCHARGE

2. - A LIST OF SUBSTANCES TO BE REDUCED
  (THERE SHOULD BE PROVISION FOR REVISION OF AND ADDITIONS TO LISTS 1 AND 2 AS WELL AS CRITERIA FOR LISTING EXISTING AND NEW CHEMICALS.)

3. BAN - PRODUCTS/SUBSTANCES/PROCESSES ON LIST 1. THROUGH:
   (1) PHASE-OUT WITH - SUNSET DATES
   (2) QUANTITATIVE REDUCTIONS
   (3) USING REVERSE ONUS (NOTIFICATION AND RELEASE)
   (4) MULTI MEDIA APPROACH

4. SOURCE REDUCTION OF SUBSTANCES ON LIST 2.
   (1) QUANTITATIVE REDUCTIONS (ALLOWING INDUSTRY TO DETERMINE HOW THEY REACH THE GOAL)
   (2) MULTI MEDIA
   (3) USING REVERSE ONUS
   (4) PLANNING/AUDITS
   (5) TECHNOLOGICALLY BASED

5. IMPLEMENTATION
- ECONOMIC INCENTIVES (INCLUDING TAX INCENTIVES, PREFERENCE IN PUBLIC PROCUREMENT, ASSISTANCE WITH COSTS OF RESEARCH AND DEVELOPMENT ETC)
- TECHNICAL ASSISTANCE
- ENFORCEMENT - PENALTIES
- PUBLIC PARTICIPATION IN SCOPING
- EDUCATION
PUBLIC SUIT PROVISION/STAKEHOLDER INVOLVEMENT
REGIONAL IMPLEMENTATION WITH STAGED APPLICATION
NATIONWIDE
INFORMATION
1) EXCHANGE
2) MONITORING
3) REPORTING
PERMITTING
AN ANALYSIS OF THE STATUTORY FRAMEWORK FOR THE BAN OR PHASE-OUT OF HAZARDOUS CHEMICALS

A Report Submitted To

The International Joint Commission
Virtual Elimination Task Force

In Fulfillment of Contract #7586854

By

Jeffer A. Foran, Ph.D.
Assistant Professor and Director
Environmental Health and Policy Program
Department of Health Care Sciences
The George Washington University
2150 Pennsylvania Ave., NW
Washington, D.C. 20037

Ann Jarrell, Esq.
Research Scientist
Department of Health Care Sciences
The George Washington University
2150 Pennsylvania Ave., NW
Washington, D.C. 20037
ACKNOWLEDGEMENTS

This report was prepared at the Department of Health Care Sciences, The George Washington University. Laura Kolb, Paul D’Jock, Kolyma Huot, and Craig Knight contributed technical and research assistance throughout the project.
I. INTRODUCTION

Toxic chemicals have posed well documented threats to the health of the Great Lakes ecosystem (International Joint Commission, 1989). These threats have been widely recognized by governments charged with restoration and maintenance of ecosystem quality in the Great Lakes basin. These threats have also been documented in several reports. For example, in a recent report (Conservation Foundation, 1989), some of the impacts of toxic chemicals in the basin were identified in Great Lakes fish and wildlife. These effects include population decline, reproductive impairment, eggshell thinning, morphological deformities, tumors/cancer, immune system suppression, behavioral changes, and population and community-level effects.

Similarly, the health of the human population in the basin has also been threatened. The National Wildlife Federation (1989) has suggested that the risk of cancer associated with consumption of Great Lakes sport fish is substantially elevated. Further, Great Lakes researchers have documented the adverse effects of consumption of contaminated sport fish by mothers on their developing fetuses and young children (Jacobson, et al., 1984). Finally, the International Joint Commission, in an April 1990 report, concluded:

When available data on fish, birds, reptiles and small mammals are considered along with human research, [the conclusion must be made 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.

Despite over two decades of regulation, less than complete success has been achieved in addressing the problems caused by the discharge of toxic chemicals into the Great Lakes ecosystem. Recent reports suggest that over 500 chemicals in the basin continue to cause serious threats to the health of the Great Lakes ecosystem and its human residents (International Joint Commission, 1983). Yet, efforts to implement activities to control toxic chemicals, such as the Great Lakes Water Quality Agreement's goal of virtual elimination of persistent toxicants, have not been fully successful.

These ecological and human health threats and a lack of apparent ability to control and eliminate them provide clear reasons for further actions to ameliorate the impacts of toxic chemicals in the basin. One emerging concept that may play an important role in controlling toxic chemicals in the Great Lakes basin is a Sunset process. The basic premise of this process is that some chemicals as well as processes and products associated with them must be eliminated through ban, phase-out, use restrictions, or substitution. In this report we present a brief
description of a Sunset process and we evaluate existing policy that may be useful in the implementation of such a process. We discuss whether sufficient authority and implementation mechanisms exist within current laws and regulations of the U.S. and Canada to implement a Sunset process. As part of this analysis, we present two brief case examples of chemicals that have been banned or phased-out under existing U.S. legislation.

II. SUNSETTING: THE PROCESS

Background

Chemical use and disposal have led to numerous instances of pollution that threaten human health, wildlife, and the integrity of ecosystems. Regulatory programs designed to control chemical use, disposal and their associated problems have traditionally been site and chemical specific. Few, if any activities have evolved to address sources of pollution and fewer still have been coordinated between state, national, or international jurisdictions.

Some chemical specific management activities have occurred such as for CFCs and a few other industrial chemicals and for some pesticides (two examples are described later in this document). Where a chemical ban has been proposed under these activities however (e.g. DDT), it has been based on relatively undefined socio-political values which do not transcend the specific chemical ban. The lessons learned from these activities are of limited use in addressing other existing problems or anticipating future problems.

Some new initiatives for coordinated chemical control were begun through the Organization for Economic Cooperation and Development (OECD). OECD has recognized that most chemicals are not confined within political borders and that chemical specific regulatory activities, particularly where they are based on end-of-pipe or disposal regulations, have not prevented widespread environmental pollution. The new initiatives, which include consideration of a process called the Sunset Chemicals proposal (Whalstrom, 1989; Foran, 1990), advocate exposure reductions and elimination for certain hazardous chemicals. Exposure reductions and elimination may occur through a combination of activities that include phase-out or ban of the chemical, changes in or phase-out and ban of certain manufacturing processes, and changes in or phase-out and ban of certain products.

Although proposed by an OECD member country (Sweden), the Sunset Chemicals proposal has received little support in most OECD member countries. At the 14th joint meeting of the OECD Chemicals Group (May, 1990), member countries generally opposed the concept of chemical phase-out or ban and advocated instead much softer proposals for international chemical assessment.
Yet, support for a Sunset process that includes chemical phase-out and ban remains strong in at least two member countries - Sweden and the Netherlands. However, it is unlikely that a comprehensive process for chemical phase-out and ban will be adopted by OECD member countries including the U.S. and Canada.

A comprehensive process where chemicals, processes, and products are substituted, phased out, or banned requires coordinated, international participation. This is particularly true where chemicals are manufactured and commercially imported or exported or where they inadvertently cross international borders through drift or migration. A Sunset process may provide an effective approach to managing existing and new hazardous chemicals and encouraging the development and use of safer substitutes (Foran, 1990). Such a process will be particularly effective where chemicals, processes, and products are evaluated via a uniform set of criteria and managed through a set of coordinated activities ranging from information gathering to phase-out or ban.

Components of a Sunset Process

A 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. Once criteria are developed, hazardous chemicals that should be banned or phased out would be identified via the criteria. Industries that manufacture, use, store or dispose the chemicals would then be required to develop a plan for phase-out or ban of those chemicals. The plan would be developed cooperatively with all participating jurisdictions where the chemical is produced, stored or used. The Sunset process should include a quantitative component (e.g. 50% reduction in use or discharge must occur within 5 years), and the process would ultimately require a ban (sunset) on the chemicals identified on the list.

The goal of a Sunset process is to eliminate exposure to humans and the environment of the most hazardous chemicals. Where an industrial process change results in reduction or elimination of environmental or human exposure, a ban on the use of the chemical may not be necessary immediately. Sufficient time to develop alternate technologies or alternate, safer substitute chemicals prior to implementation of a ban is important to this process. However, the Sunset process includes a ban as a forcing mechanism to develop safer substitutes and to eliminate environmental and human exposure.

A systematic management process that is adopted and coordinated regionally and internationally will enhance efforts
to control the impacts of hazardous substances on humans and the environment. A Sunset process may eliminate reliance on existing management techniques that focus on one chemical/issue at a time and that concentrate control technology at the end of the discharge pipe. Activities that proceed case-by-case rather than through use of comprehensive, systematic management processes will not result in effective, long-term management of the very large number of hazardous chemicals that require multi-media management activities.

A Sunset process that addresses only phase-out or ban 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 a substantial risk to human health or the environment may require a ban. Risk management 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 process. Either 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, where they are developed and utilized for new chemicals, can be coordinated with data collected under existing data collection programs. Existing data can then be evaluated via Sunset criteria to guide jurisdictions or industries in making uniform decisions regarding development or marketing of new chemicals.

The criteria development process can be conducted in two ways. Criteria can be developed based on decisions that have driven past management activities where countries have agreed to ban or restrict the use of a chemical (e.g. CFCs). Unfortunately, relatively few activities of this sort have occurred. Alternately, criteria can be developed based on a set of 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 a set of criteria that can be adopted and applied uniformly in participating jurisdictions. However, any process to develop criteria must incorporate all segments of society including government, industry, and the public sector since risk management decisions will ultimately affect all individuals within and outside of participating jurisdictions.
Any comprehensive, uniform risk management strategy adopted by participating jurisdictions should include information exchange on existing risk management methodologies and implementation. Further, risk management strategies adopted by participating jurisdictions should allow, at least initially, some flexibility in implementing different management options that result in the same outcome (elimination of exposure). Flexible management options would provide opportunities to eliminate exposure while minimizing economic and social impacts and, at the same time, 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 requirements for use or emission reductions and ultimately bans on, or sunset of some compounds.

A Sunset Process in the Great Lakes Basin

Several fora are available to develop and work toward implementation of a process prototype for international cooperation on the management of hazardous chemicals. A few members of the European Community (EC) and the OECD have expressed interest in such activities. However, the diversity of the EC and OECD member countries, broad resistance toward adoption of a Sunset process, and the lack of an organization with strong oversight responsibility and a focus toward international environmental protection eliminate these groups as candidates for prototype development and adoption.

Unlike the EC and OECD, the Great Lakes basin provides an ideal setting for developing and implementing a Sunset process for hazardous chemicals, processes, and products for the following reasons:

A comprehensive, coordinated process for regional and international management of hazardous chemicals in the Great Lakes basin has not been developed;

The Great Lakes are shared by two nations, the U.S. and Canada, which also share responsibility for pollution of the ecosystem and its effects. These effects, from chemicals which may enter the system from one nation but which readily cross international borders, range from elevated cancer and reproductive risks in humans to gross impairment of wildlife and threats to ecosystem structure, function, and integrity;

The Great Lakes basin provides a system where a multitude of different regulatory activities are intended to address similar types, sources and
effects of pollution, often with little or no success on the scale of the ecosystem;

A bi-national governmental organization, the International Joint Commission, provides an existing tool for international cooperation on development and adoption of coordinated management activities for hazardous chemicals.

Phase-out and bans of hazardous chemicals are not unprecedented activities although regional or international cooperation on phase-out and bans is unusual. Activities on CFCs have evolved internationally through recognition of the global environmental impacts of these chemicals, although relatively few other examples of this level of international cooperation exist. Below we present a discussion of both U.S. and Canadian statutes that allow for ban or phase-out of hazardous chemicals. We supplement this discussion with two examples of chemical ban or phase-out drawing on past regulatory activities for DDT and PCB. We conclude with some thoughts about the efficacy of existing statutes to incorporate chemical bans and phase-out as well as a comprehensive Sunset process.

III. REVIEW OF U.S. STATUTORY BASIS TO BAN OR PHASE OUT HAZARDOUS CHEMICALS

Introduction

This section provides a preliminary review of U.S. environmental laws that provide for ban or phase-out of hazardous environmental chemicals and that may be amenable to incorporation of a Sunset process for hazardous chemicals. We focus the analysis on the legislative basis to ban, phase out or substitute hazardous chemicals. Also, we examine briefly the potential for implementation of a comprehensive management activity such as a Sunset process through existing statutes. A chart depicting all major federal statutory provisions under which bans, phase-out, or substitution of hazardous chemicals may be achieved, as well as other less severe regulatory activities is presented in Table 1.

This review will be limited to three U.S. statutes: The Toxic Substances Control Act (15 USC 2401 et seg), the Federal Insecticide, Fungicide and Rodenticide Act (7 USC 136a et seg), and the Federal Food, Drug and Cosmetic Act (21 USC 301 et seg). Many of the environmental laws that have been enacted can be placed into four categories (Worobec and Ordway, 1989):

1) Chemical use and assessment laws;
2) Statutes affecting chemicals as byproducts of processes;
Implementation Authority

The Environmental Protection Agency

As the central and principal federal agency charged with environmental enforcement, the EPA's goal is "to safeguard human health and the environment from risks posed by pollution." To achieve this goal, the EPA focuses on cases of greatest risk, where solutions are practical and legal authority is clear.

Key areas toward which EPA directs its resources include:

1) examining all environmental media to assess total risk;
2) balancing environmental gains against other goals;
3) improving environmental quality through implementation of source reduction and environmentally sound recycling practices;
4) encouraging the principles of environmental federalism outlined in Executive Order 12612 (e.g., a performance-based regulatory approach that permits States significant flexibility to implement standards that are tied to site-specific conditions);
5) pursuing alternatives to traditional regulation (e.g., negotiation and other forms of consultation to enable all interested parties to participate in environmental rule making);
6) reducing scientific uncertainty (expanding risk assessment information); and
7) concentrating enforcement resources on violations posing the greatest risk to human health and environment.

The U.S. EPA has primary enforcement authority for two of the three U.S. statutes examined in this paper; TSCA and FIFRA. The U.S. EPA also has substantial authority to regulate pesticides in foods under FIFRA/FFDCA. The Food and Drug Administration retains the remainder of the authority to implement and enforce the provisions of the FFDCA.

1. Toxic Substances Control Act

Background

In the late 1960s approximately 300 to 500 new chemical compounds were being introduced into commercial use each year with potential to reach the environment through use or disposal. An EPA official testified before Congress that ten to twenty percent of these new compounds represented environmental threats. Based on a CEQ report and this testimony, the Nixon administration drafted the first Toxic Substances Control Act (TSCA) legislation (Druley and Ordway 1977).
In addition, public concern over the latent hazards of asbestos, vinyl chloride, heavy metals, polychlorinated biphenyls (PCBs), chlorinated fluorocarbons (CFCs), and the inadequacy of existing laws to regulate these types of hazardous substances highlighted the need for the 92nd through the 94th Congresses to generate toxic substances control legislation.

The 94th Congress heard recurrent themes in testimony on poisoning from mercury-treated seed, incidence of vaginal cancer in females whose mothers had taken diethyl stilbestrol during pregnancy, the effects of PCBs, and the incidence of cancer from exposure to vinyl chloride and arsenic. To demonstrate the need for pretesting chemicals prior to exposure during manufacture or use, a case study of the cancer deaths of chemical plant workers from exposure to bis(chloromethyl) ether was presented to the 94th Congress.

At that time, many of these substances did not fall within the technical parameters of existing statutes - the Clean Air Act, the Federal Food, Drug, and Cosmetic Act, the Federal Insecticide, Fungicide, and Rodenticide Act, or the Consumer Product Safety Act. Due to the mounting evidence of their potentially highly toxic effects on human health and the environment, it became imperative to develop new laws or reform existing laws to control these substances prior to their manufacture, use, release, and disposal.

During this period, Russell W. Peterson, chairman of the CEQ, testified that toxic substances legislation should meet three major needs:

The government should receive information and reports on production and use of chemicals and any health or safety studies available;

The government should be empowered to require testing to assess harmful effects of chemicals on human health and the environment, and;

The government should be given the authority to deal with chemical substances not adequately covered under other legislation. (Emphasis added)

Peterson additionally stated that the burden of proof of the safety of a chemical should be on the manufacturer since chemicals, unlike people, should not be presumed innocent until proven guilty.

Key industry representatives also acknowledged the regulatory gaps in existing legislation. C. Boyd Shaffer of the Manufacturing Chemists Association conceded that chemicals should be adequately tested for their potential effects on health and the environment. He stated:
...we recognize that in spite of the remarkable profusion and complexity of the laws that already have been enacted to protect health and the environment, there remain gaps in the pattern of regulatory control of health and environmental hazards, and there may well be a need for a law specifically to close those gaps....

From 1972 to 1975, the House held hearings on the development and adoption of a toxic substances control law. Key among the negotiations on the development of such a law were considerations of provisions that the EPA could propose a rule banning or limiting the manufacture, processing, or distribution of a chemical substance and the rule could become effective upon publication in the Federal Register if the EPA administrator determined there was likely to be an unreasonable risk to health or the environment before the effective date of a final ruling.

In Senate/House Conference Committee proceedings, provisions of some sections of the proposed law required pre-manufacture notification to "reflect the conferees recognition that the most desirable time to determine the health and environmental effects of a substance, and to take action to protect against any potential adverse effects, occurs before commercial production begins. Not only are human and environmental harm avoided or alleviated, but the cost of any regulatory action in terms of loss of jobs and capital investment is minimized."

In 1976, the Toxic Substance Control Act was adopted. For the first time, a mechanism was available to regulate toxic substances before, during and after their manufacture, marketing, and use.

Specific Statutory Provisions of TSCA Relevant to Ban, Phase-out or Substitution of Hazardous Chemicals

Under TSCA, the EPA Administrator was given a broad array of tools and options to regulate chemical substances and mixtures that may "present an unreasonable risk of injury to health or the environment, and to take action with respect to chemical substances and mixtures which are imminent hazards." The following sections of the statute include provisions to ban or phase out hazardous chemicals.

Section 5(e)

Under this section, the Administrator of 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 development of information with respect to a new substance. The decision to limit or prohibit manufacture should be based on the following findings:

1) That there is insufficient information to make a "reasoned evaluation of the health and environmental effects of a chemical substance...;"

2) Without such information, the manufacture, processing, distribution in commerce, use, or disposal may present an unreasonable risk of injury to health or the environment, and;

3) The substance is or will be produced in substantial quantities and either enters or may reasonably be anticipated to enter the environment in substantial quantities or there is or may be significant human exposure to the substance.

In the House and Senate Conference Committee Report, the conferees recognized that manufacturers could attempt to defeat the objective behind section 5(e) which provides regulatory controls where data are insufficient, by continuing to manufacture or process a new substance or existing chemical until adequate testing can be performed. Therefore, the conferees intended that the authority to grant preliminary relief could be freely exercised as necessary to preserve the status quo and to ensure that the policy of this section could be fulfilled. If a court granted an injunction to prohibit manufacture under this section and the Administrator also initiated a rule making proceeding under 6(a) (discussed below), the injunction would remain in effect until the effective date of the 6(a) rule or until the section 6 proceeding terminated, whichever occurred first.

Section 5(f)

Under this section, if the Administrator finds a reasonable basis to conclude that a chemical substance presents an unreasonable risk of injury to health or the environment prior to promulgation of a section 6 rule (discussed below), the Administrator has two options: 1) issuing a proposed rule under section 6(a), or; 2) issuing a proposed order to prohibit the manufacture, processing, or distribution in commerce of the substance.

In discussing the relationship of sections 5(f) to 6(a) and 6(d) in placing prohibitions or limitations on new substances or significant new uses for existing substances, the conference committee report states that section 5(f) "authorizes the Administrator to issue a proposed rule under section 6(a), but
such rule is to be effective upon its publication in the Federal Register."

The conferees recognized that section 6(d) authorizes the Administrator to make a proposed section 6(a) rule immediately effective. However, to invoke the section 6(d) authority, the Administrator must find an imminent, unreasonable risk of serious or widespread injury. With respect to new chemical substances or substances with significant new uses, immediate action is authorized under section 5(f) when there is an imminent, unreasonable risk of injury, regardless of whether the injury will be serious or widespread.

The conferees went on to state that a rule under section 6(a) authorized by section 5(f) may not totally prohibit the manufacture, processing, or distribution in commerce of a new substance or an existing substance for a significant new use. To totally prohibit a substance’s manufacture, processing, or distribution, the Administrator must issue either a proposed order or obtain a court injunction.

The conferees also recognized that in situations where there were a limited number of practical uses for a chemical substance, the Administrator could prohibit manufacture or processing completely by issuing an immediately effective proposed rule prohibiting those uses. The conferees viewed such a prohibition as a total prohibition subject to 5(f) requirements. They stated that this authority should be "utilized only when there is more than one practical use of a substance and when the prohibition does not effectively ban all such uses." The conferees went on to apply this caveat to instances where this authority would so severely limit the amount of a substance as to result in a prohibition of manufacturing, processing, or distribution.

Section 6(a)

If the manufacture, processing, distribution, use, or disposal of an existing chemical substance or mixture "presents an unreasonable risk of injury to health or the environment," the Administrator has broad authority under TSCA Section 6 to prohibit or limit production and to impose labeling or other requirements. The determination of unreasonable risk under TSCA Section 6 requires a consideration of both risks and benefits. Under Section 6(a), the Administrator can commence a formal rule making to regulate the manufacture, use, distribution in commerce, and disposal of chemical substances that present an unreasonable risk to health or the environment through the following regulatory options:

Prohibiting manufacture, processing, or distribution in commerce of a substance or mixture [Section 6(a)(1)(A)]:
Limiting the amount of a substance or mixture that may be manufactured, processed, or distributed in commerce [Section 6(a)(1)(B)];

Prohibiting manufacture, processing, or distribution in commerce of a substance or mixture for a particular use, or a particular use in a concentration in excess of a specified level [Section 6(a)(2)(A)];

Limiting the amount of a substance or mixture that may be manufactured, processed, or distributed in commerce for a particular use, or a particular use in a concentration in excess of a specified level [Section 6(a)(2)(B)];

Requiring clear and adequate warnings and instructions for use, distribution in commerce, or disposal of a substance or mixture [Section 6(a)(3)];

Prohibiting or regulating any manner or method of commercial use of a substance or mixture [Section 6(a)(5)];

Requiring or regulating any manner or method of disposal of a substance or mixture for commercial purposes [Section 6(a)(6)(A)];

Requiring manufacturer notification to purchasers or other persons in possession of or exposed to a substance or mixture [Section 6(a)(7)(A)];

Requiring public notice of risk of injury [Section 6(a)(7)(B)];

Requiring manufacturer replacement or repurchase of a substance or mixture [Section 6(a)(7)(C)].

The Administrator must choose the "least burdensome" alternative(s) that will adequately protect against the risk of injury. Section 6(c) requires the Administrator to publish a statement reflecting appropriate risk/benefit considerations based upon the following: Health effects and magnitude of exposure of human beings to a chemical or mixture; environmental effects and the magnitude of environmental exposure; benefits of a substance or mixture for various uses and the availability of substitutes for such uses, and; the economic consequences of the rule taking into account the effect on the national economy, small business, technological innovation, the environment, and public health.

Section 6(d)

Under this section, the Administrator may declare a proposed rule under subsection (a) to be effective upon its
publication in the Federal Register if the Administrator has determined that any combination of activities related to a chemical substance or mixture is likely to result in "an unreasonable risk of serious or widespread injury to health or the environment" before the effective date of the proposed rule.

Section 6(e)

TSCA Section 6(e) prohibits the manufacture, processing, distribution in commerce or use of polychlorinated biphenyls (PCBs) except in a totally enclosed manner. Section 6(e)(2)(B), however, authorizes the EPA Administrator to permit the manufacture, processing, distribution in commerce, or use of PCBs in other than a totally enclosed manner if the Administrator finds that a specific activity will not present an unreasonable risk of injury to health or the environment. Additionally, any person may petition the Administrator for an exemption from the Section 6(e) ban, which may be granted by rule upon a finding that no unreasonable risk of injury to health or the environment would result and that good faith efforts had been made to develop a chemical substitute for PCBs. An exemption is limited to one year from the date it is granted (Section 6(e)(3)(B)).

Section 7

If a chemical substance or mixture "presents an imminent and unreasonable risk of serious or widespread injury to health or the environment," the Administrator, under this section, may proceed directly to district court for injunctive and other relief, including seizure and condemnation of the chemical.

In their comments on Section 7, the conferees stated that if the Administrator has not used the Section 6 authority to protect against an imminent hazard, "the Administrator must bring an action under Section 7." The conferees clearly stated that this duty is "non-discretionary." In addition, the conferees did not require that the "observance of an actual injury is essential" to establish an imminent hazard.

Section 13

Under Section 13, the Administrator may ban or prohibit the import of any chemical substance of mixture if it fails to comply with the provisions of TSCA, a rule or court order under Section 5 or 6, or civil action brought under Section 5 or 7.

Implementation

Under TSCA, the EPA regulates existing and new substances that may pose an unreasonable risk to human health or the
environment. Specifically exempted substances include food, drugs, pesticides, nuclear materials, tobacco, firearms, and ammunition unless their combined effects make it most appropriate for regulation under TSCA or these substances cannot be adequately addressed under other statutes. Exempted existing chemicals include those used solely for research and development.

There are no time limits set on adverse effects, and no conditions are set on the degree or nature of what constitutes "unreasonable risk." For all new chemicals (with exceptions noted above), the EPA is required to perform risk evaluations taking into account the substance's possible societal and economic benefits, availability of alternative substances, potential health effects, and any other factors that demonstrate the risks or benefits that may result through the "manufacture, processing, distribution, use, or disposal of the substance." The latter activities are all subject to TSCA jurisdiction, but TSCA does not define "use" or "dispose," and statutory definitions of the remaining activities are vague. The EPA's implementing regulations provide some clarification, but in some cases the scope of TSCA jurisdiction remains unclear and varies among TSCA regulatory provisions.

The U.S. EPA has experienced substantial difficulties in implementing TSCA. The TSCA Inventory of Chemical Substances was not completed until June 1979, and the Section 5 new chemical review provisions were not effective until 1 July 1979. Few existing chemicals have faced regulation under Section 6 (Hayes, 1989). Aside from the mandatory regulation of PCBs under Section 6(e), the most well known regulatory action concerned the phasing out of many uses of asbestos in 1989. Below we discuss briefly the phase-out of PCBs under TSCA.

The PCB Case

Monsanto Industrial Chemicals Co. manufactured PCBs in the United States from 1929-1977 under the trade name Aroclor (Waid, 1986). Aroclor was primarily sold as a coolant and dielectric (a nonconductor of direct electric current). As initial toxicity tests revealed no adverse affects from PCBs, their use grew rapidly and was virtually unrestricted until the early 1970s. Evidence that PCBs were accumulating in the environment was presented as early as 1966 when PCB tainted fish and wildlife were discovered. However, PCB use did not become a public issue until 1968 when the Yusho, Japan poisoning incident received widespread publicity. More than 1,000 persons ingested PCB contaminated rice oil and were affected with chloracne, jaundice, and a host of other symptoms.

The FDA, prompted by concern for contamination of the food supply in light of the emerging evidence for PCB toxicity, began a survey of PCBs and environmental contamination in 1972.
The FDA then set tolerance levels for PCBs in foods in 1973. They also prohibited the introduction of new equipment or machinery containing PCBs into food plants, food packaging manufacture establishments and feed storage areas. The FDA regulations required the replacement of PCB containing fluids to the fullest extent possible.

Public concern with exposure to chemicals such as PCB grew as media coverage of the scientific evidence for adverse health effects increased and as incidents such as the Yusho poisoning became public. The President's Council on Environmental Quality had reported that a testing and control program for toxic substances was needed, and Congress was concerned with the mounting evidence that unregulated carcinogens were in widespread use (e.g. vinyl chloride, asbestos, PCBs). PCBs were still in widespread use when Congress enacted TSCA in 1976 in an effort to close gaps in the existing toxic substances legislation. In fact, the magnitude of the PCB problem prompted Congress to single out PCBs for specific treatment under TSCA.

TSCA gave the EPA the authority to ban, control, or restrict the manufacture, use, import or disposal of a chemical. The EPA did not begin enforcing TSCA until 1979, however, when the PCB Ban Rule was promulgated. TSCA has four provisions specifically concerning PCBs. These include:

1) Prohibition of manufacture of PCBs after 2 July 1979 unless specifically exempted;

2) Prohibition of the processing, distribution in commerce, and use in a non-totally enclosed manner after 2 July 1979;

3) Authorization of exceptions to #2, and;

4) Prohibition of all processing and distribution in commerce after 1 July 1979 unless specifically exempted.

Thereafter, PCBs could not be manufactured, used in a non-totally enclosed manner, sold, or processed unless an exemption or authorization was made by the EPA. The totally enclosed use and disposal of existing PCBs were also controlled, but not necessarily banned by EPA.

With respect to the regulatory provisions listed above, the U.S. EPA defined PCBs to mean "PCBs at a concentration of 50ppm or greater unless otherwise specified." Therefore, the use of PCB in totally enclosed systems, and the disposal of PCB in concentrations of less than 50ppm would not be regulated in most instances. The 50ppm cutoff was considered reasonable from a health risk and an administrative standpoint. (There was one major exception to the 50ppm cutoff; waste oil containing any
detectable PCB level was prohibited as a sealant, coating or dust control agent.) The 1979 Rule has specific provisions governing transformers though their manufacture ceased in 1977; the EPA was reluctant to ban PCB use in transformers in part because of the difficulty in finding an adequate replacement.

The intent of Congress was to stop the manufacture and use of PCBs except in a totally enclosed manner or by exemption under Section 6(e) of TSCA. The EPA's implementation actually allowed the use of PCBs in small quantities (less than 50ppm). However, in 1977, during the period of PCB rule making, the major producer of PCB, Monsanto, voluntarily ceased production.

In 1980, the Environmental Defense Fund (EDF) challenged the regulation setting the 50ppm PCB level maintaining that virtually all PCB uses would still be possible. The U.S. Court of Appeals then remanded the 1979 Ban Rule to the EPA for further action. In 1981, the EDF and industry members filed a petition to stay the court's mandate pending the development of additional regulations. The petition was granted.

The EPA revised the Ban Rule in two parts. The first part, the Closed and Controlled Waste Manufacturing Process Rule (1982), excluded from general prohibition several processes. The second part, the Uncontrolled Rule (1984), excluded certain other processes from regulation and allowed limited recycling. When the Uncontrolled Rule took effect, the stay was lifted and therefore any activity involving any quantifiable level of PCBs was banned unless the EPA specifically authorized the activity under these two rules.

This action made illegal various activities involving low PCB concentrations which were not addressed in the Uncontrolled Rule. Several industry members petitioned the EPA to reconsider the use of PCB at low concentrations in processes not addressed in the two rules. The EPA addressed the industrial concerns through a 1988 amendment to cover PCB exclusions, exemptions and authorizations. The EPA had not anticipated the number of activities that would be banned when the 50ppm level was removed so, under the amendment, the 50ppm level was reinstated with the exception of waste oil.

Exemptions to Section 6(e) of TSCA may be and have been granted by the EPA provided the petitioner has made a good faith effort to replace PCBs and that the risk to human health and the environment is not unreasonable. For example, legislation is pending concerning scrap metal recycling which results in PCB release to the environment. The EPA may revise regulations under TSCA to permit some limited shredding of scrap metal.

Other regulatory bodies and statutes have also addressed PCB, both through bans and phase-outs. The U.S. Food and Drug Administration monitored the status of the U.S. EPA's regulations
in an effort to correlate their own attempts to regulate PCBs. The FDA had proposed in 1980 to regulate transformers and capacitors to prevent possible contamination of the food supply. They held their proposal in abeyance while the EPA revised their regulations under court order. The FDA proposed regulations were withdrawn when it appeared that the 1982 revised rule more strictly regulated PCB use in transformers and capacitors and the EPA record indicated its measures should be adequate to protect human health.

The U.S. Department of Agriculture (USDA) was also involved in PCB regulation. Since 1970 they had rejected new PCB equipment proposed for food processing and, in 1980 they prohibited the entry of new or replacement equipment with greater than 50ppm PCB onto any establishment regulated by the Federal Meat Inspection Act, the Poultry Products Inspection Act or the Egg Products Inspection Act. Their primary purpose was to reduce the possibility of accidental food contamination with PCBs. Their concern was prompted in part by at least 9 large scale incidents of contamination of food sources with PCB and the evidence that PCB had caused reproductive failure in mink which had consumed PCB contaminated coho salmon from Lake Michigan.

The USDA also has the power to ban imports of PCB contaminated meat or meat which has not been tested for PCBs. For example, in 1984 Mexico was prohibited from exporting meats to the U.S. because testing for PCBs and other chemicals was not performed. The ban was lifted in 1988 after Mexico revised its residue testing program.

Though various federal regulations restrict or ban PCB use, TSCA alone bans PCB manufacture (except in the case where PCBs are inadvertently generated at concentrations less than 50ppm). Use of existing PCB continues in totally enclosed systems although these uses also are being phased out. The manufacturing ban on PCB has been successful (although it occurred voluntarily). However, the phase-out of PCB uses, which began in 1979 and continues today, has not resulted in total removal of sources of PCB to the environment. Many industries have found substitutes for PCB uses, although several uses will continue until existing stocks of PCBs are exhausted.

Discussion

EPA has been criticized for conservatively interpreting its sweeping authority under Section 6 of TSCA to regulate existing chemicals. A former director of EPA’s Office of Toxic Substances blamed its limited use on the procedural and substantive constraints of Section 6 and has called for legislative relief. While TSCA provides the Administrator with ample authority to deal with toxic substances, problems such as data deficiencies, resource deficiencies, lack of staff
expertise, and the Act’s cumbersome procedures hamstring his efforts to exercise his authority effectively (Gaynor, 1977).

William Rodgers (1988) of the University of Washington states:

From the point of view of the decision maker the Section 6 regulatory options are in competition not only with one another but also with other regulatory choices under TSCA. It may be sufficient for the moment to opt for reporting under Section 8, testing under Section 4, regulation pending the development of information under Subsection 5(e), or process-probing under Subsection 6(b). The Administrator may strike quickly under Section 7, or Subsection 5(f), or may take a running start with a Subsection 4(f) threshold determination of risk that requires a more definitive action within 180 days. For the practitioner, this multiplication of administrative options spreads strategies more thinly than is customary. Parties must sort out their preferences--do they prefer reporting to testing, and testing to labeling, and labeling to banning, and a Subsection 4(f) deferral to all of the above? And they must assemble these packages to appeal to the regulatory staff. In the real world, of course, decision options are more complex yet, reaching laterally across TSCA and into the other environmental laws, and beyond them to other laws administered by other agencies.

Gary Davis (1990) of the University of Tennessee states:

TSCA is the sleeping giant of federal environmental legislation. It has the potential to accomplish much positive change if it were reformulated and given proper backing. At present the patchwork of toxic chemical regulations....is inconsistent, slap dash, and simply not effective in controlling toxics production, use and disposal. Further, there is no clear goal behind TSCA to reduce the use of toxic chemicals and to promote safe substitutes.

Davis states further that:

The U.S. EPA and other nations, with coordination by international organizations, should implement a range of policies to phase out the production and use of priority chemicals. Policy measures for the phase-out of priority chemicals should include bans, restrictions on certain uses, financial incentives, research and development, and public education.

We believe that the mechanisms for ban and phase-out of toxic chemicals are in place under TSCA. However, we agree with
Davies that those mechanisms have not been used to their full potential. In fact, only a very small fraction of the chemicals which fall under the regulatory network of TSCA have been adequately evaluated for hazard to the environment and human health. Even fewer chemicals have been regulated under TSCA and virtually none have been banned. The most ambitious effort toward phasing-out an environmental pollutant to occur under TSCA was the regulation of PCB. However, after more than 10 years of regulatory activity, uses of this ubiquitous environmental pollutant have yet to be completely banned.

2. Federal Insecticide, Fungicide, and Rodenticide Act - FIFRA

Background

The Federal Insecticide Act of 1910 was the first federal legislation passed to control chemical pesticides. The basic form of control was to require appropriate labeling of pesticides to protect consumers from adulterated or misbranded products. Standards for labeling were set, and the responsible government authority at the time, the USDA, inspected and removed products not meeting those standards from distribution in commerce.

In 1947, the first version of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) was passed. It required warning labels and instructions for a wider variety of products as well as registration of products with the USDA if intended for interstate commerce or export. Neither the 1910 nor 1947 statute required consideration of effects on human health or the environment.

Most of the protective provisions under the 1947 Act were ineffective if a manufacturer filed a protest against a USDA refusal to register a product. The manufacturer was allowed to continue to market the product. USDA could then only remove it or prevent distribution through seizure. This regulatory gap was addressed in the 1964 FIFRA amendments which permitted the USDA to deny or suspend registrations based upon safety concerns.

In 1970, the pesticide regulatory staffs of both USDA and FDA were consolidated and incorporated into the newly created EPA. In response to public pressure from environmental activists, EPA canceled the registrations of several pesticide chemicals (DDT is discussed below) over the next few years due to their "unreasonably severe" effects on the environment and the availability of alternative control methods (Worobec and Ordway, 1989).

In 1972, major amendments to FIFRA were passed to ensure that the benefits of a chemical substance were weighed against the risk of harm to the environment. The 1972 Act is the statute currently referred to as FIFRA. A wide range of activities was
declared illegal under the 1972 amendments such as using a pesticide inconsistently with its labeling or the selling or receiving of adulterated, misbranded or unregistered pesticides. The changes in the 1972 Act were not achieved with the consensus of interest groups apparent in the legislative history of the 1910 Act. The 1972 amendments have been described as severely compromised, the result of a good deal of interest-splicing between several committees urged on by warring constituents.

The 1975 amendments to FIFRA did not significantly change the Act with respect to its ban or prohibition related activities. There was an intensive jurisdictional struggle between USDA and EPA over EPA's registration powers, but Congress opted to impose additional procedural constraints on EPA's decision making and consultation with the USDA. Congress rejected the proposed amendment by environmental groups to place the burden of proof of a pesticide's safety in suspension and cancellation proceedings on the proponent for continued use.

Significant changes resulting from the 1978 amendments include directing the EPA to consider use restrictions as an alternative to cancellation and giving priority to pesticides remaining in foods during the re-registration process.

In 1986, a landmark "consensus agreement" was reached between representatives of the National Agricultural Chemicals Association and the Campaign for Pesticide Reform. The provisions of their agreement are reflected in the Senate and House bills and the 1988 FIFRA amendments which include cancellation of registrations obtained with false data and tightening of the regulation of inert ingredients and of the treatment of residues of banned pesticides in food.

Specific Statutory Provisions Relevant to Ban, Phase-out or Substitution

Section 3(a)

Section 3(a) provides that no person in any State may distribute, sell, offer for sale, hold for sale, ship, deliver for shipment, or receive and (having so received) deliver or offer to deliver, to any person any pesticide which is not registered with the Administrator of the U.S. EPA.

Section 3(c)

This section requires that all pesticides be registered with the U.S. EPA. Generally, no person may distribute or sell any pesticide that is not registered under the Act. To the extent necessary to prevent unreasonable adverse effects on the environment, the Administrator may by regulation limit the
distribution, sale, or use in any State of any pesticide that is not registered and that is not the subject of an experimental use permit under Section 5 or an emergency exemption under Section 18 of the Act.

The Administrator may register a pesticide if he determines that:

1) Its composition is such as to warrant the proposed claims for it;
2) Its labeling and other material required to be submitted comply with the requirements of the Act;
3) It will perform its intended function without unreasonable adverse effects on the environment, and;
4) When used in accordance with widespread and commonly recognized practice it will not generally cause unreasonable adverse effects on the environment.

If the Administrator determines that the requirements for registration under the Act are not satisfied, he may notify the applicant for registration of his determination to refuse to register the pesticide.

Through the registration process, the EPA Administrator can effectively prohibit or ban a newly discovered chemical or new use for an existing chemical through a refusal to register the chemical or through cancellation at re-registration. The Administrator is also empowered to place any restrictions necessary on use of a pesticide to protect against unreasonable adverse effects on the environment.

Section 6(b)

If it appears to the Administrator that a pesticide or its labeling does not comply with the provisions of the Act and, when used in accordance with widespread and commonly recognized practice, generally causes unreasonable adverse effects on the environment, the Administrator may issue a notice of his intent to either:

1) Cancel its registration or change its classification, or;
2) Hold a hearing to determine whether or not its registration should be canceled or its classification changed.

Under this section, the Administrator must consider the "impact of the action on production and prices of agricultural commodities, retail food prices, and otherwise on the
agricultural economy." Therefore, like TSCA, FIFRA is a "risk/benefit" or balancing of interests statute.

Pesticides determined to represent imminent hazards are regulated under Sections 6(c) and 6(d). The Administrator can also take action to stop sales and uses of pesticides as well as remove or seize them from production.

Section 6(c)

Section 6(c) enables the Administrator to ban use or distribution of a pesticide if it is necessary to prevent an imminent hazard. If the Administrator determines that action is necessary to prevent an imminent hazard during the time required for cancellation or change in classification proceedings, he may suspend the registration of the pesticide immediately. An order of suspension may not be issued unless the Administrator issues notice of his intention to cancel the registration or change the classification of the pesticide. The Administrator may notify the registrant prior to issuing any suspension order. The registrant then has an opportunity for an expedited hearing before the Administrator on the question of whether an imminent hazard exists.

Section 17

Generally, pesticides intended solely for export to a foreign country may not be banned by the Administrator under the Act. A foreign importer must be notified if pesticides intended for export have been banned in the U.S. Further, whenever a registration, or a cancellation or suspension of the registration occurs, the Administrator must transmit through the State Department notification to the governments of other countries and to appropriate international agencies. Such notification should include all information related to the cancellation or suspension of the registration of the pesticide.

The DDT Case

DDT was first used as an insecticide during World War II to combat malaria and other insect-borne diseases. It was also credited with halting the Naples typhus epidemic (Dunlap, 1981). The demonstration of DDT's effectiveness generated favorable publicity for the insecticide; thus, in 1945, when DDT was released for civilian use, farmers welcomed it. DDT was inexpensive and its high toxicity to insects, low acute toxicity in mammals, and persistence were considered desirable qualities leading DDT to become, during the 1950s, the most widely used pesticide in the U.S.
The USDA and FDA differed on the safety of DDT. The USDA, assuming a safe product, began vast spraying programs with DDT in an effort to eradicate pests. The FDA, in contrast, did not recommend DDT use and set interim tolerance levels for the insecticide in food, as well as a zero tolerance level for milk. (Under the Food, Drug, and Cosmetic Act the FDA could only set binding tolerance levels after lengthy hearings.)

DDT use became a public issue in 1950 when the House Committee to Investigate the Use of Chemicals in Food Products began its hearings. Though DDT was a minor issue at the time, doubts were raised by independent scientists and the FDA as to DDT’s safety for prolonged use. The committee concluded that pesticide registration was necessary and that the applicants should bear the burden of proof of safety for the chemical. The recommendations of the committee were eventually incorporated into the Miller Amendment of the Food, Drug and Cosmetic Act (1954).

The general public did not become involved in the debate over DDT safety until the 1950s and early 1960s when they began noticing the impacts of widespread spraying such as dead birds and the disappearance of fish from streams. Influential conservation organizations like the Audubon Society became concerned as bird mortality increased and evidence for the bioaccumulation of DDT mounted. Rachel Carson had investigated the pesticide issue and caught the public’s attention with her book Silent Spring in 1962. The book increased public concern and prompted investigation into pesticide use and policy. Concurrently, Congress began hearings concerning pesticide regulation and President Kennedy’s science advisers also began a study of pesticide policy.

Amid this heightened awareness of environmental issues, a group called the Environmental Defense Fund (EDF) was formed in 1967. They launched legal action in an effort to ban DDT based on existing legislation. In 1968, the EDF participated in a hearing which eventually achieved national recognition. EDF asked the State of Wisconsin to rule on whether DDT was a water pollutant. This gave the EDF the opportunity to publicize the DDT issue. Plentiful evidence was presented for and against DDT use by expert witnesses throughout the hearing.

The EDF released information concerning DDT to the press during the Wisconsin hearing and articles appeared almost daily regarding the risks of DDT use. Public opinion was clearly running against DDT during this period, and adverse publicity concerning DDT concentrations in maternal milk further damaged the industry position that DDT was a safe chemical. Concurrent with the Wisconsin DDT case, the FDA seized 20,000 pounds of coho salmon in Michigan on the ground that the pesticide residue in the fish was too high for human consumption. In response, the Michigan Department of Agriculture canceled the majority of DDT
registrations to safeguard its sport and commercial fishing industry.

The Wisconsin hearings were adjourned in 1969. Wisconsin ultimately ruled that DDT was a water pollutant and published the notice in May 1970. However, DDT use had already been effectively halted in Wisconsin by the Natural Resources Board refusal to issue DDT use permits during the 1968 growing season.

While Wisconsin and Michigan were considering the DDT issue, the Federal Government was investigating pesticide regulation under FIFRA. In 1968, the Government Accounting Office (GAO) reported to Congress that the USDA's enforcement of FIFRA was deficient. This prompted Congress to begin an independent investigation into the matter. The consensus opinion was that FIFRA was not being enforced by USDA and that the federal government had generally taken no specific action to increase pesticide control. (FIFRA enforcement activities were transferred to the EPA when that agency was formed in 1970.)

Public opinion against the use of DDT mounted when the National Cancer Institute found that DDT was carcinogenic in mice. Though wildlife mortality had caused some concern, the threat of cancer had a substantially greater impact on public opinion. The banning of cyclamates in soft drinks by the FDA on suspicion of their carcinogenicity also set a precedent for the ban of other possible carcinogens that occurred in foods.

The Environmental Defense Fund continued to press for a ban on DDT at the national level. In 1969, the EDF with the Sierra Club, the Western Michigan Environmental Action Council and the Audubon Society petitioned the persons responsible for FIFRA enforcement, the Secretary of Agriculture and the Secretary of HEW. They requested suspension of DDT registration, commencement of cancellation procedures, and setting the tolerance level for DDT in foods at zero. In response, HEW Secretary Finch decided to phase out all but essential DDT uses by the end of 1971 and Agriculture Secretary Hardy decided to ban DDT use in residential areas.

The EDF did not consider these measures to be adequate and continued their litigation. William Ruckelshaus had just taken charge of the newly formed EPA when he was ordered by the courts in January 1971 to suspend all DDT registrations. The EPA now had the power under FIFRA to regulate and register pesticides as well as the power to ban or limit their use. Ruckelshaus invited interested parties to submit their views and supporting evidence before he made his final decision.

The EPA canceled all registrations for DDT products and uses pursuant to FIFRA in early 1971 with the onset of a formal administrative review of all DDT registrations. The DDT cancellation was appealed by 31 registrants resulting in the
Consolidated DDT Hearings. One hundred and twenty five expert witnesses testified with evidence on the safety or adverse effects of DDT. The evidence for DDT carcinogenicity in mice and the extrapolation of those data to humans was discussed. Further data were presented concerning the bioaccumulation and chronic toxicity of DDT. The USDA sided with DDT manufacturers in opposing the EPA's registration cancellation while the EDF supported the proposed cancellation. DDT manufacturers and the USDA also asked for a gradual phase-out of DDT rather than a complete ban.

In June 1972, the EPA Administrator banned all but three of the remaining uses of DDT on crops. This ban eliminated virtually all DDT use since most DDT use was on commercial crops. The Administrator removed the ban on restricted DDT use by public health officials and military personnel. Use of DDT in prescription drugs was also permitted.

Discussion

FIFRA, through use cancellations and registration suspensions, may be used to ban or phase-out hazardous pesticides. These activities have occurred for several hazardous pesticides such as DDT. However, to suspend or cancel a pesticide, EPA must employ a "tortuous mechanism" fraught with "procedural obstacles" that may account for the current decline in enforcement actions (McCabe 1989). M. Lolley (1990) states:

...the cancellation or suspension of a pesticide under FIFRA is governed by overly broad and imprecise standards that can be manipulated by political ideologies and that shift with the tide of public sentiment. The result is inconsistent and inefficient pesticide regulation that leaves the public confused and uncertain about the health risks to which they may be exposed by ordinary consumption of pesticide-treated fruits and vegetables, and suspicious of a regulatory system that sets no definite threshold on health risks imposed on the public.

There is some legislative activity in Congress to amend FIFRA. A former chairman of the House Agriculture Subcommittee which has jurisdiction over FIFRA has proposed a bill (H5170) for dealing with some of the problems of the existing statute. Recommendations have been made to lower the threshold for cancellation of pesticides and for changing the cancellation hearing process into an informal rule making. The proposed bill sets up a process for suspending a pesticide which poses a risk too high to wait for the cancellation process to occur. In the interim, the use of the pesticide would not be allowed as the cancellation process proceeds. The bill also proposes a very rapid emergency suspension process for pesticides which pose such
a great risk that they cannot wait even for the regular suspension procedure.

We believe that FIFRA currently contains language adequate to ban or phase-out of hazardous pesticides. However, as in TSCA, the road-blocks to pesticide ban or phase-out are many and difficult to overcome. Further, there is no systematic process for evaluating the hazard of existing pesticides to determine which should face the most stringent regulatory management activities. A Sunset process, with clearly defined criteria for hazard evaluation and a comprehensive set or management activities including ban and phase-out, would allow comprehensive regulation of all pesticides (both existing and new) and removal of those that pose the greatest hazard to the environment.

3. Federal, Food, Drug, and Cosmetic Act

Background

The attempt to secure a broad national law to protect citizens of the United States from the expanding threat of adulterated food, drink, and drugs began in 1879 and continued through a quarter century to 1906 (Young 1989). The primary focus of the Food and Drug Act was prohibiting shipment of misbranded or adulterated foods, drugs, or drinks across state lines and false advertising on medicine labels. The Bureau of Chemistry enforced the law until 1927 when the Food, Drug, and Insecticide Administration was created. In 1931, it was renamed the Food and Drug Administration (FDA). In 1953, the FDA was transferred from USDA to HEW (now DHHS).

The framework for the current version of Federal Food, Drug, and Cosmetic Act (FFDCA) was established under the 1938 statute. Major revisions were passed due to the inability of courts to find "exact wording in the law" to convict violators of the standards for food purity and to halt fraud in patent medicine sales (Worobec and Ordway 1989). After more than 100 deaths from poisonous medicine, Congress passed the 1938 FFDCA. The law’s coverage was extended to cosmetics and medical devices, it required predistribution clearance for new drugs, it set tolerance levels for toxic substances, it authorized standards for food containers, and it provided a judicial remedy—the court injunction.

Selected portions of the 1954 FFDCA are pertinent to chemical ban and phase-out. Sections 406, 408, and 409 of the Act pertain specifically to environmental contamination by pesticides.
Specific Statutory Provisions Relevant to Ban, Phase-out or Substitution

Non-pesticide substances are regulated by the FDA. The process for development of tolerances for pesticides, food additives, and other food adulterants are described below and attributed to the Secretary of DHHS. The functions formerly vested in the FDA for setting tolerance levels for pesticides were transferred to the U.S. EPA in 1970. Thus, the U.S. EPA has substantial authority for regulating pesticides in foods.

Sections 406

Any poisonous or deleterious substance added to any food is deemed unsafe under the Act unless, when the substance is required or cannot be avoided, the Secretary of DHHS promulgates regulations that limit the quantity so that public health is protected. Any quantity exceeding the limits set by the Secretary is deemed to be unsafe. For this purpose, the Secretary promulgates regulations establishing tolerances with respect to the occurrence of the substance in or on food. The Secretary may establish the tolerance for a substance in or on any food at a zero level if the scientific data do not justify the establishment of a greater tolerance.

Section 408

This section states that any poisonous or deleterious pesticide added to a raw agricultural commodity is deemed to be unsafe unless:

1) A tolerance for the pesticide has been prescribed by the Administrator of EPA and the amount of pesticide in the product is within the tolerance limits, or;

2) The pesticide has been exempted from the requirement of a tolerance by the Administrator.

Under this section, which applies to raw agricultural commodities, the EPA Administrator may establish the tolerance at a zero level if the scientific data do not justify the establishment of a greater tolerance. However, under this section, the EPA is committed to undertake a risk/benefit analysis to limit exposures "to the extent necessary to protect public health" and to give appropriate consideration to the economic effects, other ways exposures may occur, and the utility of the pesticide.
Section 409

Like pesticides, a food additive is deemed to be unsafe under the Act unless:

1) it is specifically exempted under the Act, or;

2) there is a regulation issued prescribing the conditions under which the additive may be safely used.

No such regulation may be issued if an evaluation of the data fails to establish that the proposed use of the food additive will be safe. Specifically, no additive may be determined to be safe if it is found to induce cancer when ingested by man or animals.

The Secretary, based upon an evaluation of the data, may determine that a tolerance is required to assure that the proposed use of an additive will be safe. In this case, the Secretary may not fix a tolerance at a level higher (stricter) than reasonably required to accomplish the physical or other technical effects for which such additive is intended.

Other Sections

Action levels are set in place of tolerance levels for chemical contaminants occurring naturally or inadvertently (e.g. fish/shellfish contamination from banned pesticides or other residues in contaminated water). The EPA and FDA set action levels above which contaminated food may not be offered for sale in interstate commerce.

Discussion

The power to establish tolerances, monitor the food supply, and take enforcement action is distributed among several government agencies. Hui (1979) notes the confusion and misunderstandings that have arisen in the actual enforcement of the two statutes under EPA administration:

Section 406 has created some problems. This section permits the establishment of tolerances for added poisonous or deleterious substances, including pesticides, when these substances occur in food from 'unavoidable' sources of contamination. For example, various species of fish contain residues of pesticides and industrial chemicals, such as dieldrin, DDT, PCB, Mirex, Kepone, and mercury, irrespective of where they
are caught. No one has intended that these chemicals be present in fish or directly added to the fish from certain technical purposes. Normally the EPA or FDA ban an undesirable pesticide (or related chemical) from, or decline to issue an approval for its addition to or use on food as a means of preventing contamination. Obviously, these "unavoidable" contaminants cannot be banned since they have never been approved to be used on fish in the first place. On the other hand, potential harm from the consumption of these fish cannot be ignored.

Although FFDCA may set a zero tolerance for substances in food, this statute may not provide a direct mechanism for chemical ban or phase-out. Rather, zero tolerances are set only after a chemical has been manufactured and used; thus, reaching non-target environments and posing environmental and human health hazards. The FDA may also take actions such as those for PCBs where the agency prohibited the introduction of new equipment or machinery containing PCBs into food plants, food packaging manufacture establishments and feed storage areas. However, this activity did not address release of PCBs, in any form or quantity, to the environment and thus does not address environmental fate and transport. Therefore, of the three statutes discussed in this section, FFDCA may be the weakest for implementing ban or phase-out activities for hazardous environmental chemicals.

4. State Statutes

Under the doctrines of federal preemption and primary jurisdiction the development, administration, and interpretation of environmental laws are predominantly federal functions. States are generally charged with enforcement of the federal environmental statutes and regulations. State environmental statutory provisions are usually valid only when they provide for equal or stricter standards than those imposed under the associated federal law.

A preliminary review of the eight Great Lakes state environmental laws reveals a minimal number of provisions related to hazardous chemical control. Most state regulations governing hazardous chemicals provide requirements on their storage, transportation, or disposal but do not address their manufacture, processing, use, or distribution in commerce. These latter activities are preempted for regulation under TSCA. As discussed below, this relationship differs markedly from the Canadian federal-provincial relationship for hazardous chemical regulation.

In the area of pesticide control, many states have enacted laws that address the registration, labeling,
distribution, and use of pesticides. For example, New York has enacted a law that gives jurisdiction over all matters pertaining to the distribution, sale, use and transportation of pesticides to the New York Commissioner for environmental conservation. The commissioner is authorized to promulgate a list of restricted use pesticides and any conditions or limitations on uses of pesticides that will be permitted. Minnesota enacted law in 1987 to ban the use of chlordane within the state. A Minnesota state senator suggested that the state was trying to enact law to ban chlordane because of the frustration with EPA’s slow pace in canceling registrations of the pesticide. Minnesota law presently states that no-one may sell, use or apply chlordane or its derivative heptachlor within Minnesota.

There are also numerous ongoing legislative efforts at the state and local level related to toxics use reduction (TUR). These laws address the reduction of toxic chemical use in a variety of ways including changes in production processes, products or raw materials that reduce, avoid, or eliminate the use of toxic or hazardous substances, and the generation of hazardous byproducts. In 1989, Massachusetts, Oregon, and Illinois passed the first TUR laws. Over a dozen other states have since passed laws with similar TUR approaches. Some of the laws only address hazardous waste management while others require industry to reduce chemical use. However, none of these state laws contain provisions for ban or phase-out of hazardous chemicals.

IV. REVIEW OF THE CANADIAN FEDERAL AND PROVINCIAL LEGISLATIVE BASIS TO BAN OR PHASE-OUT HAZARDOUS CHEMICALS

Introduction

The rise of regulatory "control" legislation in Canada has been characterized as an evolution from blanket prohibitions of harmful substances to more realistic control regimes (Webb 1988). Early legislation like the federal Fisheries Act of 1868 completely prohibited discharges of deleterious substances into water frequented by fish. However, the amended Act (1960) made it an offense to deposit deleterious substances into water unless the deposits were of a type, quantity, or under conditions specified by regulation.

It was not until 1970-1971 that the Canadian Department of Environment was established. The principal environmental statutes at that time were the Canadian Water Act, the Clean Air Act, and the Fisheries Act. The aims of these statutes were centered on pollution control. The variety of regulatory control options under these statutes included: bans and prohibitions, licensing, registration, labeling, control or stop orders, program approvals, setting of tolerance or action levels, and seizure and removal.
In September 1972, a federal task force cited the failure of existing federal legislation to prevent damage to ecological systems. In addition, existing federal and provincial legislation was not reflective of a multi-media treatment of environmental problems and was "reactive and essentially ad hoc in its approach (MOE, 1972)." In response to these criticisms as well as growing public awareness of the dangers of environmental contaminants, the government began a major legislative initiative. On 1 April 1976 the Environmental Contaminants Act was proclaimed.

The Environmental Contaminants Act (ECA), like the U.S. TSCA, provided the Canadian government with regulatory tools to investigate and control the manufacture and import of contaminants in the environment. The ECA was also designed to address environmental problems not covered by existing legislation and was known in the literature as a "residual statute." The ECA paralleled many of TSCA's provisions including pre-market screening for new chemical substances.

With respect to the ability of the ECA to carry out its broad mandate to protect against significant danger to health in the environment, a government official noted:

In the six years following its promulgation, a number of deficiencies were identified in the operational implementation of the act, not surprising considering the statute was a prototype piece of legislation for Canada; and experience in Canada and elsewhere indicated the control of toxic substances required very sophisticated legislative tools (BNA, 1987).

In 1982, the Departments of Environment and Health and Welfare were charged with conducting an interdepartmental review of the ECA. After an extensive review process, the federal government elected to produce a new, comprehensive environmental law instead of using proposed legislation to amend the ECA (Allard, 1989).

On June 30, 1988 the Canadian Environmental Protection Act (CEPA) was proclaimed. CEPA repeals and replaces the Canada Water Act, the Clean Air Act, the ECA, and the Ocean Dumping Control Act. The definition of "substance" under the Act encompasses hazardous air and water pollutants or contaminants as well as hazardous waste affecting air, land, water, all layers of the atmosphere, all organic and inorganic matter and living organisms.

1. Canadian Environmental Protection Act

The provisions of Section 8.1 of the Act clearly reflect the "cradle-to-grave" or life cycle approach to
environmental management intended by the statute. The Minister of the Environment is directed to formulate environmental quality objectives, environmental quality guidelines, release guidelines recommending quantities or limits, and environmental codes of practice that specify procedures, practices, or release limits for environmental control during any phase of development and operation. One significant change between the ECA and CEPA involves the shifting of the burden of proving the safety of a substance to the proponent of manufacture or use. The former "reason to believe" standard for the Minister's assessment of the safety of a substance was modified to "reason to suspect" and allowed the Minister authority to require sufficient data to make the assessment.

Specific Statutory Provisions Relevant to Ban, Phase-out or Substitution

Section 18

Where the Minister has reason to suspect that a substance is toxic or is capable of becoming toxic, he may require notice from a person engaging in an activity involving the substance and require testing for the purpose of assessing whether the substance is toxic or potentially toxic.

Sections 25 through 29

These sections, entitled "Substances New to Canada", require compilation of a "Domestic Substances List" and describe how new substances will be identified, notified, assessed and regulated. Section 27 enables the Minister to prohibit any manufacture or import of any substance not in conformance with requirements of the Act. Upon assessment of any information, the Minister may prohibit any manufacture or import of a substance under Section 29(1)(b) or prescribe particular restrictions or conditions under Section 29(3).

Sections 32 and 34

These sections permit the Governor in Council, on recommendation of the Ministers, to enact regulations with respect to toxic substances including the prescription of quantities of a substance and the prescription of quantities that may be released into the environment.

Section 40

Under subsection (b) of this section the Minister may:
1) replace a substance or product with one that does not pose a danger to the environment or to human life or health;

2) accept the return of the substance or product from the purchaser and refund the purchase price, or;

3) any other measures for the protection of the environment or of human life or health.

Discussion

There has been controversy as to whether CEPA has effectively surmounted the same difficulties and gaps that were identified with respect to the ECA. One essayist criticizes the authors of CEPA for not changing the design of the bureaucratic procedures and the administrative flaws under the ECA. He also reprimands Environment Canada for lack of leadership which is reflected through its preoccupation with an outmoded, single chemical approach to dealing with toxic chemicals (Hall 1987). In the ten year period between 1975-86, the Contaminants Control Branch of Environment Canada had completed regulations for only five chemicals, three of them (including PCBs) that are no longer manufactured. In his essay, Hall details the cumbersome procedures and considerable delays in determining the toxicity of a chemical under the ECA as being "dragged out" even more under CEPA. Hall recommends:

The regulatory approach should be: keep chemicals out of the environment. If the officials of Environment Canada had a strong sense of environmental quality, they would stop wasting the country’s time trying to decide which of 60,000 chemicals are a toxic threat to humans and to the environment and get on with the task of stopping chemical contamination -- period.

Another writer similarly reproaches the failure of the Minister of the Environment to compile either the Domestic or Non-domestic Substances Lists required under CEPA (Vigod 1990). The New Substances Notification Regulations have also yet to be finalized. In addition, Vigod believes that the federal government has abdicated its responsibility for the regulation of toxic substances to the provinces. Under section 6 of the CEPA, a federal-provincial advisory committee must be established and be given the chance to comment on any new regulations. Under sections 34(5) and 34(6), a federal regulation can be made inapplicable to a province where "equivalent" regulations exist through written agreements between the Minister and the government of the province. Vigod comments:

These sections undermine the federal government’s responsibility for implementing a comprehensive
nationwide toxics program. Clearly, extensive use of
the equivalency provisions may result in a patchwork of
inconsistent regulations and enforcement practices
across Canada.

Vigod ultimately concludes that the public will see no
more than a token role for federal regulation of existing 'bad
actor' chemicals despite the public’s continuous calls for the
federal government to play a greater role in environmental
protection.

2. Pest Control Products Act

Introduction

The Constitution Act of 1867 provides for concurrent
federal-provincial legislation with respect to agriculture,
although a federal law will prevail in a conflict-of-laws dispute
with a province. Generally, the federal government establishes
classification and labeling requirements for pesticide products
while the provinces establish control over their actual use
through permits and licensing requirements.

Control of pesticides is regulated under several
statutes. Primary regulation occurs under the Pest Control
Products Act. However, pesticide regulation can occur also under
the Food and Drugs Act, the Fisheries Act, and CEPA. Authority
for registration, tolerance setting, monitoring and enforcement
is dispersed over four separate federal departments - Agriculture
Canada, Health and Welfare Canada, Environment Canada, and
Fisheries and Oceans Canada. However, acceptability of new pest
control products is determined exclusively by Agriculture Canada.

Canadian federal pesticide legislation has had an
evolutionary process similar to U.S. pesticide legislation.
Early statutes were focused toward product efficacy, labeling and
consumer fraud considerations. The 1969 amendments to the Pest
Control Products Act of 1939 extended federal authority to
control handling and use of pesticide products as well as inert
ingredients. Significant issues prompting extensive debate among
Parliament members revolved around farmers' health and safety,
the environment, adequate pre-registration testing prior to
availability for use and provision for research into non-chemical
alternatives. However, unlike FIFRA, the PCPA does not require
risk/benefit analysis in registering pest control products.
Specific Statutory Provisions Relevant to Ban, Phase-out or Substitution

Section 4.

This section gives Agriculture Canada broad statutory power to control pesticides from their manufacture to their ultimate use.

Section 18 (Regulations developed under the statute)

The Minister may refuse to register a control product if, in his opinion:

1) the application for registration or the label for the control product does not comply with the Act;

2) the information provided to the Minister on the application is insufficient to enable the control product to be assessed or evaluated;

3) the applicant fails to establish that the control product has merit or value for the purposes claimed when the control product is used in accordance with its label directions;

4) the use of the control product would lead to an unacceptable risk of harm to:

(i) things on or in relation to which the control product is intended to be used, or

(ii) public health, plants, animals or the environment;

5) the control product is not required to be registered.

Section 20 (Regulation developed under the statute)

The Minister may cancel or suspend the registration of a control product when, based on current information available to him, the safety of the control product or its merit or value for its intended purpose is no longer acceptable to him.

Discussion

Very few control product suspensions or cancellations have occurred under the Pest Control Products Act. Generally, regulatory actions have addressed particular uses of pesticides. As of 1987, only fifty to sixty pest control products have been suspended or canceled while six to seven hundred actions have
been taken against specific pesticide uses (Castrilli and Vigod 1987).

There is a perceived conflict of interest with the agriculture department serving as both a promoter of food production and protector of the public from unsafe pesticides and practices. Yet, representatives of some federal and state agencies believe that the registration process should remain with Agriculture Canada while the role of other agencies in the review process should be increased (Castrilli and Vigod 1987). However, a report entitled Recommendations for a Revised Federal Pest Management Regulatory System (Pesticide Registration Review Team, 1990) recommends the development of a self-contained Pest Management Regulatory Agency, reporting directly to the Minister of Health and Welfare Canada. The Pesticide Registration Review Team has developed a complete revision of the pesticide regulatory process which exists under the PCA. This new framework envisions substantial enhancement of the efficacy of pesticide regulation and control in Canada.

3. Federal Food and Drug Act

The Canadian FDA regulates contaminants in food and drug products. Use of particular substances such as additives may be absolutely prohibited. For example, the Food and Drug Act prohibits pesticide residues on food and provides the authority for establishing maximum residue limits (MRL) for agricultural chemicals. Amendments to the FDA (1978) provided that a food is adulterated if it contains more than 0.1 ppm of any agricultural chemical not specifically listed in the FDA regulations. The burden of proving the chemical nature, level and safety of a product is on the applicant for registration.

The Canadian Food and Drug Act is not generally used to ban or phase out hazardous chemicals or associated processes and products. It addresses only those substances that occur as contaminants in food products, and then applies regulation at the point of contamination.

ONTARIO

Introduction

Pollution control statutes have been developed by all the Canadian provinces. Their primary orientation is on permitting, licensing and regulating discharges of contaminants. The laws of a province do not extend beyond its borders, and there is a wide disparity of protection or prevention standards among the environmental laws passed by the individual provinces. While Ontario has been in the forefront of developing environmental protection legislation, its statutes generally do not address ban
and phase-out of hazardous chemicals. Below we summarize the Ontario Environmental Protection and Pesticides Acts.

1. The Environmental Protection Act

Ontario enacted its own Environmental Protection Act (EPA) in 1971 to regulate both air and water pollution. The 1971 Act combined the regulatory provisions of the previous Air Pollution Control Act and the Waste Management Act. Parts I and II of the EPA provide a regulatory scheme for controlling sources of pollution and potential pollution activities. However, these provisions relate generally to discharges and emissions of hazardous substances. Under the EPA, the closest activity to a ban of a hazardous substance is a stop order, which may be issued where an activity poses a hazard to human health or the environment.

2. The Pesticides Act

Provincial legislation generally authorizes the issuance of permits and licenses to particular types of pesticide users. Many provinces have pesticide classification frameworks that parallel the PCPA. Like the American states, provincial pesticide laws are focused more heavily toward control of transportation, storage and disposal.

VI. GREAT LAKES WATER QUALITY AGREEMENT

The U.S.- Canadian Great Lakes Water Quality Agreement (GLWQA - as amended in 1987) states in Article II:

The purpose....is to restore and maintain the chemical, physical, and biological, integrity of the waters of the Great Lakes Basin Ecosystem. To achieve this purpose, the Parties agree to....eliminate or reduce to the maximum extent practicable the discharge of pollutants into the Great Lakes system.

Consistent with this provision, it is the policy of the parties that: The discharge of toxic substances in toxic amounts be prohibited and the discharge of all persistent toxic substances be eliminated.

Although the GLWQA cites the laudable goal of virtual elimination for persistent toxic substances, enforcement authority does not rest with the U.S.-Canadian International Joint Commission, nor does there appear to be adequate enforcement authority for the virtual elimination mandate of Article II under existing U.S. or Canadian Statutes. Therefore, as presently written, this agreement does not provide an existing
legislative basis to implement a forcing mechanism for the ban or phase-out of hazardous chemicals in the Great Lakes basin.

VII. THE MONTREAL PROTOCOL

In 1974, the theory linking ozone depletion to chlorine released from chlorofluorocarbons (CFC) was developed. Since that time, mounting evidence confirms the significant risk of further ozone depletion.

The first international negotiations on CFCs were conducted under the United Nations Environment Program (UNEP). An international agreement, the Montreal Protocol on substances that deplete the ozone layer, was signed in September 1987. The agreement requires the signatory nations to implement a fifty percent phased reduction in the fully halogenated CFCs and halons over the next decade. As of 1 January 1990, forty-eight nations (including the U.S. and Canada) had ratified the Protocol. In April 1989, seventy nations met in Helsinki and adopted a non-binding resolution to completely phase out production and consumption of CFCs and halons. The United States has called for a complete phase-out of CFCs and halons by the year 2000 if adequate substitutes become available.

On 12 August 1988, EPA published a final rule (53 FR 30566) implementing the U.S. obligations under the Protocol. Under the final rule, the EPA has allocated production and consumption allowances (these are transferable) to CFC producers and importers consistent with their 1986 activity levels. The EPA has also entered into a consent decree to finalize by 15 August 1991 a decision on additional regulations, if any, needed to protect the stratospheric ozone layer.

Two sets of regulations on halons and CFCs to be implemented under CEPA Part II were published in the Canada Gazette on September 12, 1990. A third regulation added three halons to the List of Toxic Substances in Schedule I of the Act.

Provisions Relevant to Ban, Phase-out, or Substitution

Article 2 of the Protocol calls upon all parties to ensure that for the one year period beginning on the first day of the seventh month after the effective date of the Protocol, their CFC production levels do not exceed the 1986 production and consumption levels but also taking into account that levels may have increased by ten percent since 1986. Article 2(4) requires a fifty percent reduction in production levels taking into account that levels since 1986 may have increased by fifteen percent.

Article 2(5) allows parties producing less than twenty five kilotons to receive or transfer to another party any
production in excess of the limits for purposes of "industrial rationalization."

Article 4: Control of Trade with Non-Parties

Within one year of the entry into force of this Protocol, each party shall ban the import of controlled substances from any State not party to this Protocol. Beginning on 1 January 1993, no Party operating under paragraph may export any controlled substances to any State not party to the Protocol.

Article 4(3) provides for compilation of a list of products containing controlled substances and those parties not objecting shall ban within one year of the list’s effective date, the import of those products from a non-member. Article 4(4) provides that five years after the Protocol’s effective date, the parties shall determine the feasibility of banning or restricting non-member imports of products produced with, but not containing controlled substances. Parties not objecting to the list of such products made pursuant to Article 10 shall ban or restrict imports of those products from any non-member within one year of the list’s effective date.
VIII. SUMMARY AND CONCLUSIONS

Summary

Toxic chemicals have posed threats to the health of the Great Lakes ecosystem system since the basin was industrialized (International Joint Commission, 1989). Reports suggest that over 500 chemicals in the basin continue to cause threats to the health of the Great Lakes ecosystem and its human residents (International Joint Commission, 1983). Yet, despite decades of regulation, the problems caused by the discharge of toxic chemicals into the Great Lakes ecosystem have not been adequately addressed. Further, efforts to implement activities to control toxic chemicals, such as the Great Lakes Water Quality Agreement’s goal of virtual elimination of persistent toxicants, have not been fully successful.

A new concept, called the Sunset process, has the potential to play an important role in implementing strategies to control toxic chemicals in the Great Lakes basin. This process recognizes that some chemicals as well as processes and products associated with them must be eliminated through ban, phase-out, use restrictions, or substitution. We have presented in this document an overview of the components of the Sunset process. We discuss whether sufficient authority and implementation mechanisms exist within current laws and regulations of the U.S. and Canada to implement this process.

Findings

The U.S. Toxic Substances Control Act (TSCA), the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the Canadian Pest Control Products Act (PCPA) and the Canadian Environmental Protection Act (CEPA) are broad statutory vehicles amenable to incorporation of a sunset process. These statutes contain provisions for implementation and enforcement of chemical bans, phase-outs, and substitutions. They can also be used to screen new chemicals to determine which should and should not be manufactured and marketed (birth control). However, current interpretation, implementation, and enforcement of the pertinent portions of these statutes has not resulted in ban or adequate phase-out of most existing hazardous chemicals. Nor do existing screening activities adequately identify those chemicals that should not be manufactured or marketed.

Other U.S. statutes including the Clean Water Act (CWA), the Clean Air Act (CAA), the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund) do not appear, as written, to be as broadly amenable to incorporation of a Sunset process. However, the CAA does call for the phase-out of CFCs and some activity in the U.S. is occurring to amend RCRA
to include the potential to ban or phase-out selected hazardous chemicals and related processes and products. In the Great Lakes basin, the Great Lakes Water Quality Agreement, although calling for the virtual elimination of persistent toxicants, does not enable direct statutory authority to implement ban and phase-out activities for hazardous chemicals.

Ban and phase-out activity has occurred both nationally and internationally (e.g. for PCB, DDT and CFCs discussed in the report). However, these activities appear to have been promoted by specific citizen concern and implemented via development of specific new provisions or language in regulatory policy. A comprehensive strategy to evaluate the environmental and human health hazards of existing and new chemicals, and to determine appropriate management activities, including ban or phase-out, has not been developed. Development and adoption of a Sunset process would allow comprehensive chemical assessment and facilitate decisions on the need for bans, phase-outs, or other comprehensive management activities.

Ban or phase-out of most hazardous chemicals in Canada and the U.S. have not been coordinated between the two countries. For example, the pesticide DDT was banned in the U.S. in the early 1970s while a final DDT ban did not occur in Canada until December 1990. Alternatively, Canada has banned the pesticide alachlor while this product continues to be manufactured and used in the U.S. Where the two countries share environmental systems and resources, lack of coordination in hazardous chemical management activities, including ban and phase-out of the most hazardous substances, will result in incomplete protection of systems such as the Great Lakes.

The conclusions regarding ban and phase-out activities under TSCA, FIFRA, CEPA, PCPA, and the Great Lakes Water Quality Agreement are presented below.

**TSCA**

EPA has been criticized for conservatively interpreting its authority under Section 6 of TSCA (which allows ban and phase-out) to regulate existing chemicals. While TSCA provides ample authority to deal with toxic substances, problems such as data deficiencies, resource deficiencies, lack of staff expertise, and the Act’s cumbersome procedures hamstring efforts to implement bans and phase-outs. Gary Davis (1990) of the University of Tennessee states:

TSCA is the sleeping giant of federal environmental legislation. It has the potential to accomplish much positive change if it were reformulated and given proper backing. At present the patchwork of toxic chemical regulations....is inconsistent, slap dash, and simply not effective in controlling toxics production.
use and disposal. Further, there is no clear goal behind TSCA to reduce the use of toxic chemicals and to promote safe substitutes.

Davis states further that:

The U.S. EPA and other nations, with coordination by international organizations, should implement a range of policies to phase out the production and use of priority chemicals. Policy measures for the phase-out of priority chemicals should include bans, restrictions on certain uses, financial incentives, research and development, and public education (highlights added).

We believe that the mechanisms for ban and phase-out of existing chemicals and restriction or prohibition of the manufacture and marketing of new chemicals are in place under TSCA. However, we agree with Davis that those mechanisms have not been used to their full potential. In fact, only a very small fraction of the chemicals which fall under the regulatory network of TSCA have been adequately evaluated for hazard to the environment and human health. Even fewer have been regulated under TSCA and virtually none have been banned. The most ambitious effort toward phasing-out an environmental pollutant to occur under TSCA was the regulation of PCB. Yet, after more than 10 years of regulatory activity, uses of this ubiquitous environmental pollutant still have not been completely banned.

**FIFRA**

FIFRA, through pre-registration restrictions, use cancellations and registration suspensions, may be used to ban or phase-out hazardous pesticides. These activities have occurred for hazardous pesticides such as DDT. However, to suspend or cancel a pesticide, EPA must employ a "tortuous mechanism" fraught with "procedural obstacles" (McCabe 1989). M. Lolley (1990) states:

...the cancellation or suspension of a pesticide under FIFRA is governed by overly broad and imprecise standards that can be manipulated by political ideologies and that shift with the tide of public sentiment.

Therefore, FIFRA, as with TSCA, has clearly incorporated the concepts of chemical ban and phase-out. However, recognition that pesticides are, by nature, hazardous substances intended for release into the environment makes determination of which pesticides need to be banned or phased out difficult. A Sunset process may allow a more efficacious determination of which pesticides should be candidates for aggressive management activities.
CEPA

In the 1980's the Canadian government replaced several of its media-specific environmental statutes with a comprehensive environmental protection act (CEPA). This Act allows the ban and phase-out of hazardous chemicals in several different media and at every point in the life cycle of a hazardous substance. However, the efficacy of CEPA in banning and phasing-out hazardous chemicals has not been adequately tested.

There has been controversy as to whether CEPA has effectively surmounted the same difficulties and gaps that were identified with respect to the ECA. One essayist criticizes the authors of CEPA for not changing the design of the bureaucratic procedures and the administrative flaws under the ECA. He also reprimands Environment Canada for lack of leadership which is reflected through its preoccupation with an "outmoded, single chemical approach to dealing with toxic chemicals (Hall 1987)."

In the ten year period between 1975-86, the Contaminants Control Branch of Environment Canada had completed regulations for only five chemicals, three of them (including PCBs) that are no longer manufactured. In his essay, Hall details the cumbersome procedures and considerable delays in determining the toxicity of a chemical under the ECA as being "dragged out" even more under CEPA. Hall recommends:

The regulatory approach should be: keep chemicals out of the environment. If the officials of Environment Canada had a strong sense of environmental quality, they would stop wasting the country's time trying to decide which of 60,000 chemicals are a toxic threat to humans and to the environment and get on with the task of stopping chemical contamination -- period.

Another writer similarly reproaches the failure of the Minister of the Environment to compile either the Domestic or Non-domestic Substances Lists required under CEPA (Vigod 1990). The New Substances Notification Regulations have also yet to be finalized. In addition, Vigod believes that the federal government has abdicated its responsibility for the regulation of toxic substances to the provinces. Under section 6 of the CEPA, a federal-provincial advisory committee must be established and be given the chance to comment on any new regulations. Under sections 34(5) and 34(6), a federal regulation can be made inapplicable to a province where "equivalent" regulations exist through written agreements between the Minister and the government of the province. Vigod comments:

These sections undermine the federal government's responsibility for implementing a comprehensive nationwide toxics program. Clearly, extensive use of the equivalency provisions may result in a patchwork of
inconsistent regulations and enforcement practices across Canada.

Vigod ultimately concludes that the public will see no more than a token role for federal regulation of existing 'bad actor' chemicals despite the public's continuous calls for the federal government to play a greater role in environmental protection.

PCPA

Relatively few control product suspensions or cancellations have occurred under the Pest Control Products Act. Rather, regulatory actions have addressed particular uses of pesticides. Only fifty to sixty pest control products have been suspended or canceled over the life of the statute while six hundred to seven hundred actions have been taken against specific pesticide uses (Castrilli and Vigod 1987).

There is a perceived conflict of interest with the agriculture department serving as both a promoter of food production and protector of the public from unsafe pesticides and practices. Yet, representatives of some federal and state agencies believe that the registration process should remain with Agriculture Canada while the role of other agencies in the review process should be increased (Castrilli and Vigod 1987). However, a report entitled Recommendations for a Revised Federal Pest Management Regulatory System (Pesticide Registration Review Team, 1990) recommends the development of a self-contained Pest Management Regulatory Agency, reporting directly to the Minister of Health and Welfare Canada. The Pesticide Registration Review Team has developed a complete revision of the pesticide regulatory process which exists under the PCPA. This new framework envisions substantial enhancement of the efficacy pesticide regulation and control in Canada.

GLWQA

Although the GLWQA cites the laudable goal of virtual elimination for persistent toxic substances, enforcement authority does not rest with the U.S.-Canadian International Joint Commission, nor does there appear to be adequate enforcement authority for the virtual elimination mandate of Article II under existing U.S. or Canadian Statutes. Therefore, as presently written, this agreement does not appear to provide the opportunity to implement a forcing mechanism for the ban or phase-out of hazardous chemicals in the Great Lakes basin.
Conclusion

The philosophy of regulatory agencies, at least in the U.S., appears to be to resist implementation of pre- and post-marketing chemical, product, or process bans. The existing political structure may not provide incentives to make stringent regulatory decisions of this type, particularly where a ban or phase-out may impose substantial economic impacts on a major industrial sector or other a portions of society.

The U.S. political system has traditionally encouraged influence and active participation from entities impacted by regulatory processes. These often competing interests offer some leverage in policy decisions to implement portions of statutes to ban or phase out hazardous chemicals. Alternatively, an attempt to ban a hazardous substance can be (and usually is) attacked or criticized by arguments of wide spread economic and social disruption. Combination of these arguments with the plethora of regulatory roadblocks that must be negotiated result in stagnation of attempts to implement portions of statutes meant to address the most hazardous substances. Thus, the inability of TSCA, FIFRA, CEPA and PCPA to ban or phase out many of the most hazardous substances probably does not result from inadequate statutory language. Rather, the inability derives from the immense number and size of the legislative obstacles to ban and phase out hazardous substances and the lack of political will to overcome these barriers.
Table 1. Sections of United States statutes that contain language addressing bans, phase-out or substitution, quantity limitations, and other requirements. MP = manufacturing process, CD = commercial distribution, I = import, EE = emissions effluent, D = disposal.
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Source - Federal Activities in Toxic Substances, 1983
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POLICY AND REGULATORY OPPORTUNITIES FOR THE IMPLEMENTATION OF VIRTUAL ELIMINATION IN THE GREAT LAKES BASIN

A Report Submitted to

The International Joint Commission
Virtual Elimination Task Force

In Fulfilment of Contract No. 7586903

By

Isobel W. Heathcote, Ph.D.
Wyndham Research Inc.
35 Firstbrooke Road
Toronto, Ontario M4E 2L2

March 1991
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1.0 INTRODUCTION

This report will examine the Canadian legislative and policy framework supporting the implementation of virtual elimination in the Great Lakes Basin. It should be read in tandem with a parallel report prepared by Lee Botts and Glenn Paulson on U.S. legislation, and with a report prepared by Jeffery Foran and Ann Jarrell (1991) on regulatory and policy opportunities for the ban or phase-out of hazardous chemicals.

The report is divided into three parts. Section 1.0 is an overview of the nature and development of Canadian federal and provincial environmental law. Section 2.0 attempts to answer seven key questions regarding that framework, and its potential for the implementation of virtual elimination. Section 3.0 summarizes the findings of the study and provides some suggestions for future directions.

1.1 The Concept of "Assimilation Capacity"

Environmental law and policy in Canada has "evolved" over several decades. As with most other jurisdictions, the present regulatory framework consists of a variety of pieces of legislation of varying ages and philosophies. While all of these convey the message that "less is better", they do so in different ways, applied to different media and contaminants, and with different degrees of specificity.

Much of Canadian federal and provincial environmental law is based on the (unwritten) premise that the environment can absorb a certain amount of pollution with no adverse consequences for ecosystem integrity or balance. This concept is sometimes described as "assimilation capacity", as in the Ministry of the Environment's Stream Water Quality Assessment Procedures Manual (1980), which describes techniques for defining assimilation capacity in streams.
The concept of "assimilation capacity" arose thirty years ago, in an era when "pollution" meant conventional parameters such as biochemical oxygen demand and suspended solids. Indeed, the idea may still make sense for certain parameters, particularly those which, like BOD, decay in the environment over time. For these parameters, it is possible to imagine a steady-state condition, with ambient concentration being maintained at or below "acceptable" levels through a variety of degradation processes.

For the persistent (potentially bioaccumulative) toxic contaminants of concern to modern regulators, however, the idea of "assimilation capacity" may not be valid. For these compounds, there may be no "acceptable" level of pollution; like a bank deposit accruing interest, ambient pools of these substances are compounded with each additional discharge.

Furthermore, the laws developed in the 1960s and 1970s place considerable emphasis on point source discharges into single environmental media. More recent concerns regarding non-point source contributions from agriculture and urban areas, to and from groundwater sources, and to and from contaminated sediments and biological tissues are largely unaddressed. Little regulatory basis exists to control inter-media transfer of pollutants.

In summary, then, current regulatory arrangements were developed to address problems much simpler and more transient than those confronting regulators today. A good framework exists for the control of point source discharges of conventional pollutants to particular media (e.g. air or water). Non-point sources, "in-place" pollutants, persistent toxic chemicals and inter-media movement of toxins are seldom, if at all, addressed.

The ideas that all development will necessarily create pollution, and that all environments have some capacity to absorb waste, have therefore led to the development of a regulatory structure that may present special challenges for the management, and the virtual elimination, of persistent toxic substances. These challenges will be discussed in Section 2.0 below.
1.2 Jurisdictional Questions

Within Canada, dozens of jurisdictions enforce dozens of laws and by-laws, probably in dozens of different ways. This problem--"who's minding the store?"--was highlighted in the 1990 report of the federal Auditor General, Kenneth Dye.

The root of this problem lies in the British North America Act of 1867, now called the Constitution Act 1867. That Act lays out the powers of the federal and provincial government, but fails to make adequate distinction between the relative responsibilities of the jurisdictions for environmental matters. As time has passed and environmental problems have grown more complex, this situation has grown increasingly problematic. At present, for example, individual provinces (who, under Section 92 of the Act, have primary responsibility for the environment) have enacted various (and different) pieces of legislation for environmental control. However Section 91 of the Constitution Act, which lays out the powers of the federal government, provides for federal jurisdiction over fisheries, navigation, and inland seas. In consequence, the federal government also has enacted environmental legislation, such as the Fisheries Act. To complicate the issue further, municipalities may enact by-laws of their own under powers delegated to them by the provinces (in Ontario, this is done under the Municipal Act).

In certain areas, then, three or more levels of government may have jurisdiction over an environmental problem. An example of this was in the dredging of contaminated sediments from the Keating Channel, at the mouth of the Don River in Toronto. The federal government (who has jurisdiction over the issue as a navigational problem) supported the proposal to dredge. The provincial government originally opposed the dredging, having jurisdiction over the "sea bed" and emissions to the aquatic environment. The shoreline was part of the City of Toronto, with its various property owners and their riparian water rights. And finally the Municipality of Metropolitan Toronto, an umbrella municipality for the several area boroughs and cities, owned the trunk storm and
combined sewers that also discharged into the area. (And note that the individual boroughs and cities own the feeder sewers that enter those trunk sewers!)

Even a decision as to what constitutes an "acceptable" ambient quality can be difficult if the various jurisdictions disagree about which substances are of concern, at which levels. At the present, the federal and provincial governments have been unable to reach agreement on an acceptable protocol for the measurement of toxicity in effluents. This is a matter of some concern for the pulp and paper sector, who will soon be faced with federal regulations under the Canadian Environmental Protection Act, and Ontario regulations under the Environmental Protection Act, with separate and different reporting requirements and separate and different toxicity protocols. Industry representatives are particularly concerned about the need for them to compare performance among facilities in different provinces under consistent criteria. They perceive a clear potential for double standards and wasteful analysis and reporting regimes.

Finally, environmental degradation is being seen more and more as a global problem; the "Brundtland Report" (the report of the World Commission on Environment and Development; 1987) was perhaps the first document to bring this concern to the attention of the public. At present, Canada has undertaken few international environmental agreements on the environment. The Great Lakes Water Quality Agreement clearly is one such document; Canada's signing of the Montreal Protocol on CFC reduction is another. Transboundary movement of toxins via air, water, or surface routes will continue to be an important component of environmental management in Canada, and must be addressed through more comprehensive, multi-media arrangements.
1.3 Structures of Government

The regulatory framework discussed in Section 1.1 has led to the evolution of a complex government structure. Decisions must be made as to what constitutes an "acceptable" level of pollution in the ambient environment, and thus what level of pollution is allowable from a particular discharge pipe or smokestack.

Clearly, while an "acceptable" ambient concentration may be set reasonably easily (based, for example, on toxicity to organisms of particular sensitivity), it is much more difficult to decide what effluent discharge concentration is "acceptable" for a given area, particularly one with multiple dischargers.

In Ontario, at least, this difficulty has been resolved by a somewhat awkward regulatory "two-step". Broad principles and powers are laid down in law, especially the Environmental Protection Act and the Ontario Water Resources Act. Individual polluters are assessed on a case by case basis and site-specific requirements for them are then developed in a variety of control documents (e.g. Certificates of Approval; Control Orders).

A number of problems arise in this system. First, it creates a need for constant and sometimes considerable checking of ambient concentrations and of effluent or air emission concentrations. Government must audit industrial self-monitoring and must interpret any unusual results, again on a case-by-case basis. As several lawyers have pointed out, each pipe-specific control is a potential appeal-as is evidenced by the enormous case load now confronting the Environmental Appeal Board.

To be sure, much of this is guided by sets of guidelines for discharges and ambient quality, but these guidelines have no force in law and can be over-ridden, by Directorial authority, by the provisions of control documents.
A further difficulty arises in the resulting need for a system of regional and district sub-offices of the provincial government, who are charged with checking the performance of polluters and who are often influential in developing the terms of control documents because of their knowledge of the local situation. Policies can be, and have been, interpreted differently in different regions, leading to inequities among industrial sectors, and among individual polluters within a sector. In parts of northern Ontario, for example, surface water management policies stipulating no further impairment of pristine waters have sometimes been enforced less strictly than in southern regions. The argument in favour of this practice was that if policies were strictly enforced, no development could be allowed to occur.

In summary, Canadian federal and provincial environmental law requires us to know what level of pollution will cause an effect, and to set limits just below that level. As discussed also in Section 1.2, different jurisdictions may, and have, approached these problems differently, resulting in actual or potential inequities in "allowable" levels and enforcement.
2.0 PROBLEMS AND OPPORTUNITIES FOR THE IMPLEMENTATION OF VIRTUAL ELIMINATION IN THE GREAT LAKES BASIN

The following section contains a variety of information regarding the problems and opportunities that would exist if current legal frameworks were used to implement virtual elimination in the Great Lakes Basin. For convenience, the material is organized under the questions asked in the Terms of Reference for this project.

Question 1: What legal basis exists specifically to virtually eliminate the input of persistent toxic substances? Provide examples of how present laws and regulations have been successfully applied in support of this goal, e.g. a given chemical or within a particular industrial category.

As discussed in Section 1.2, dozens of legal instruments exist at the federal and provincial levels for the control of environmental quality. These are discussed in the following subsections.

Canadian Federal Legislation

At present, the major pieces of legislation are:

Fisheries Act

Canadian Environmental Protection Act

International Boundary Waters Treaty Act

Pest Control Products Act
Transportation of Dangerous Goods Act

Atomic Energy Control Act

Canada Shipping Act

Navigable Waters Protection Act

Of these, the Canadian Environmental Protection Act (CEPA) is clearly the most comprehensive, replacing as it does the earlier Canada Water Act, Clear Air Act, Environmental Contaminants Act, and Ocean Dumping Act. CEPA gives the federal Minister of the Environment broad powers in the development of guidelines, limits, codes of practice and other measures to protect the environment. At present, a short list of nine contaminants is regulated under CEPA (specific CFCs and halons, asbestos, lead, mercury, and vinyl chloride); a longer list of 44 is pending approval. In the view of most contacts, CEPA provides the likeliest vehicle for the implementation of virtual elimination. It may, however, prove an awkward tool. CEPA is intended to be a "residual" piece of legislation, that would take effect only after appropriate provincial legislation has been enacted. The federal government can only amend CEPA after full discussion with the provinces. In the case of a potential ban on a product, process, or raw material, it can be anticipated that considerable such discussion might be warranted, leading to significant delays in implementation.

In the past, the Fisheries Act has been a useful tool for the prosecution of water offences. This Act prohibits the discharge of "deleterious substances" into waters "frequented by fish". In proving guilt, the Ministry (most prosecutions have been undertaken by the Ontario Ministries of Natural Resources or Environment) need only prove that the substance was "deleterious" (i.e. that it was present at or above an "effect" concentration), and that the waters are "frequented by fish". They do not have to prove that an effect actually occurred;
however the degree of actual impact may be taken into account in the sentencing of a guilty party.

Ontario Legislation

Of the many Ontario provincial laws applicable to environmental management, the following are probably the most important:

Environmental Protection Act

Ontario Water Resources Act

Transboundary Pollution Reciprocity Act

Municipal Act

Planning Act

Topsoil Preservation Act

Dangerous Goods Transportation Act

Pesticides Act

Mining Act

Health Protection and Promotion Act
Of these, the Environmental Protection Act (EPA) and the Ontario Water Resources Act (OWRA) are the primary statutory authorities. The Acts differ in several ways. Most importantly, the EPA contains provisions for air, water, and waste, while the OWRA deals explicitly with water. The structure of the EPA is such that each medium is treated separately, through separate provisions. Both Acts give the Director power to stop or control the discharge of deleterious materials through a variety of documents such as stop orders and control orders.

Several contacts noted that the EPA holds that the burden of proof of harm rests with the Ministry of the Environment. This has led to difficulties with implementing certain of the apparently strong provisions of the Act. For example, Stop Orders are authorized under Section 7; however, they have never been successfully applied because of the difficulty in demonstrating that an immediate danger to human life exists. Some contacts believe that the control order system—often criticized for generous compliance timetables and short lists of limited parameters—could be strengthened and made more "proactive" in its reporting and compliance requirements.

The OWRA (which of course applies only to water) may offer an advantage over the EPA in that it does not require the Ministry to demonstrate that harm has occurred or will occur, but only proof of the possibility of harm. The Ministry may therefore impose controls (for instance, to protect a public source of water supply, under Section 19), when they can prove that harm might occur.

This need to demonstrate likelihood of impairment has led to some interesting situations in prosecution. In one example several years ago, the MOE brought a case against a discharger in North York, for a spill of 20 g of PCB which ultimately entered Lake Ontario. The defense tried to show that the "assimilative capacity" of the lake was so great that harm could not have resulted. But the judge—a lay person, perhaps swayed by recent and considerable media attention to PCBs—ruled that PCBs were so toxic that any amount would be detrimental in any environment. The concern raised by spokesmen in the Ministry was that a less "political" (but perhaps equally toxic and persistent) chemical would not have received the same treatment.
A second example involves a case brought by the Ministry against Inco, and relating to that company's discharge of acid-forming gases. In an effort to demonstrate likelihood of harm, the Ministry went into considerable detail explaining how NOx and SOx compounds are generated, how they form acids, and how this process in turn forms "acid rain". This discussion led to several days of cross-examination on a multitude of technical points--legal "smoke and mirrors", according to one source. At the end of this, the judge (again, a layman) threw up his hands and declared himself thoroughly confused. "If I can't understand this, there's reasonable doubt," he is claimed to have said. "And if there's reasonable doubt, they're not guilty." The Ministry lost the case. The point to be made here is the strong need, yet difficulty, of demonstrating "impairment".

A further difficulty noted by John Swaigen, Chair of the Ministry's Environmental Appeal Board, is the need to coordinate control documents for various media. While at times a single overriding document (for example, a Certificate of Approval) may exist, more often there may be several separate documents controlling air emissions, water effluents, waste treatment facilities, and so on. This activity is coordinated through the Ministry's Approvals Branch, which has limited staff (less than a dozen approvals officers, for example, to review and generate water effluent certificates). In 1987, that Branch was backlogged with several hundred applications for approvals. It is clearly unrealistic to expect that the provisions for every facility can be fully and consistently coordinated when such activity is clearly dependent upon limited staff resources.

Quebec Legislation

Environmental Quality Act
In Quebec, environmental quality is regulated primarily under a single statute, the Environmental Quality Act. Under this Act, a number of specific regulations have been written to control specific aspects of pollution control and environmental management. The Dangerous Waste Regulation describes a number of classes of waste (e.g. radioactive, corrosive, toxic, etc.), and specific controls for them. The Pulp and Paper Effluent Regulation lays out standards for effluent discharge from pulp and paper mills; a similar regulation has been written for mining. As a third example, a Quality of Atmosphere Regulation lists standards for air quality in the province. Under specific regulations such as the Pulp and Paper Regulation, certain wastes are classified as pulp and paper wastes, which are then exempt from regulation under the Dangerous Waste Regulation.

The lists of toxins regulated under these regulations tend to be brief. In the case of the Pulp and Paper Regulation, for example, standards are limited primarily to conventional parameters. Allowable levels of these parameters are tied to process type and volume: a certain amount of BOD is allowable if de-barking forms part of the process; a different amount is allowable for other processes. A longer list of substances is proposed under the Industrial Waste Reduction Program (IWRP; status currently uncertain; see below), but that list is still much shorter than that proposed for Ontario under the MISA effluent monitoring priority pollutant list (EMPPL). If it proceeds, the IWRP will include broad provisions for air, water and waste, presumably with wording to prohibit the transfer of toxins from one medium to another.

International Agreements

In addition to Canadian and provincial statutes, the United States-Canada Great Lakes Water Quality Agreement of 1978 (amended 1987) provides a vehicle whereby the two nations jointly agree on a series of measures and approaches for the restoration and enhancement of water quality in the Great Lakes system.
A similar Canada-US Agreement on Air Quality was signed by Canadian Prime Minister Brian Mulroney and U.S. President George Bush on March 13, 1991. This document has been drafted along the lines of the Great Lakes Water Quality Agreement and may provide a general model for future agreements on a range of other issues. It contains provisions for a dispute settling mechanism, in the event of non-compliance by either signatory party, but these provisions have not yet been made public.

Finally, Canada has joined with 47 other nations in signing the Montreal Protocol for the control of substances that deplete the ozone layer. This agreement requires the signing parties to reduce their contributions of specific CFCs and halons by fifty percent by 1997. In support of its own commitment, Canada has added to the Canadian Environmental Protection Act specific regulations to control halons and CFCs.

Examples of the Application of Present Laws and Regulations to "Virtual Elimination" or "Zero Discharge"

It is difficult to find examples of complete bans on specific chemicals within the Canadian regulatory framework. Several groups of compounds (e.g. DDT; PCBs; CFCs and halons) have been subjected to a partial ban or phase-out; however, these bans appear to have been in response to significant public concern rather than to a systematic review process. Different statutory authorities have been used to impose these controls, but all have been at the federal level. This is probably because a uniform approach to their control was seen as preferable to individual provincial statutes. Under the "peace, order, and good government" provisions of the Constitution Act, 1867, federal laws may be enacted which override provincial authority where there is believed to be reason for national concern.
PCBs were "banned" originally through specific regulations under the (federal) Environmental Contaminants Act, which now forms part of CEPA. PCB manufacture and discharge are banned, but its use in existing equipment is still allowed. Storage is also controlled under this regulation. MOE's "Blue Book" of water quality objectives and guidelines lists PCB in Table 2 as a substance with "zero tolerance limits" (no allowable concentration).

Mercury was strictly limited originally under the Clean Air Act for air emissions, and under the Fisheries Act (Chlor-Alkali Mercury Regulations) for industrial discharges to water. Its use is now limited, but not entirely banned, also under Section II of CEPA. MOE's "Blue Book" of water quality objectives and guidelines lists mercury in Table 2 as a substance with "zero tolerance limits" (no allowable concentration).

CFCs were banned in 1990 under Section II of CEPA, as described above under Section 2.1.4.

DDT is strictly controlled under the (federal) Pest Control Products Act. Although it was "banned" in 1970, it was permitted for use on apples and strawberries until 1978, and until 1990 was allowed for use on bat control. The reasons for these delays relate to the need to find appropriate alternatives (Estrin and Swaigen 1978). (A source inside the Ministry also has noted the government's reluctance to impose a complete ban when it might incur liability for existing stocks of the chemical currently in storage. A partial ban or phase-out was therefore viewed as a safer alternative.) MOE's "Blue Book" of water quality objectives and guidelines lists DDT and its metabolites in Table 2 as a substance with "zero tolerance limits" (no allowable concentration).
Specific industrial sectors have been controlled at the federal level through regulations made under the Fisheries Act and, more recently, under CEPA. Through the Municipal-Industrial Strategy for Abatement and Clean Air Programs of the Ontario Ministry of the Environment, industrial and municipal sectors will be controlled through specific limits based on best available technology--economically achievable (BAT-EA). Quebec has proposed similar legislation through its Industrial Waste Reduction Program, which is modelled on MISA; the status of this program is unclear at the present time. As described above for mercury, regulations have also been written for specific industrial processes under the Fisheries Act, for example for chlor-alkali plants (at one time major users and dischargers of mercury), but those regulations cover only discharges to water.

As discussed in Section 1.3 above, site-specific limits can be set in Ontario under the EPA through Certificates of Approval, Control Orders and similar documents. This would presumably include a limit of zero, even for substances not currently limited in other legislation or guidelines, but only if the Ministry can demonstrate that a potential impact will occur and that it is solely attributable to the particular discharger. Needless to say, this is can be a difficult task!

**Summary**

A broad regulatory framework exists, within which virtual elimination might be attempted for specific chemicals, groups of chemicals, industrial or municipal processes, or indeed whole sectors. For products, processes, or materials of grave concern, it may be advisable to undertake such a ban through federal statutes, to ensure consistency of approach across the provinces. It will clearly be necessary to negotiate similar arrangements with other nations for reasons relating to transboundary pollutant movement and market competition.
It must, however, be noted that the present framework is in some respects a "patchy" one. Examples of existing bans or strict limits can be found in a number of statutes and policies at both the federal and provincial level. The substances and processes that have been limited in this way appear to be the result of heightened public concern and outcry rather than any systematic review or risk assessment. It can therefore be inferred that there has been insufficient political will to ban other materials or processes that may be of equal concern.

The gaps in the existing regulatory framework will be discussed below.
Question 2a: Many present laws were developed with good intent. What additional opportunities are available within the present regulatory framework to virtually eliminate the input of persistent toxic substances, that is, are there tools that have not been fully utilized or developed?

CEPA: The Best (But Largely Untested) Tool?

As discussed in several sections above, considerable legal authority exists both at the federal and the provincial level to impose strict controls, bans, phase-outs, and other limits on specific chemicals and (probably) industrial processes. CEPA also provides the authority (as yet untested?) under Section 40, for the Minister to require the replacement of products of concern with others not posing a danger to the environment, or indeed to take "any other measures for the protection of the environment or of human life or health" (Section 40(b)-(iii)).

CEPA is in fact the only Canadian federal or provincial statute that expressly encompasses concerns about the inter-media transfer of contaminants. As discussed above, it therefore provides several key advantages for the implementation of virtual elimination. These are:

- consistency across provincial boundaries
- provisions for the control of products, processes, and substances of concern
- provisions to guard against inter-media transfer of toxins—an "ecosystem" approach
It also has several disadvantages:

- its potential is largely untested
- its current list of regulated parameters is very brief
- approval of substances, products, and processes not already controlled will require lengthy consultation with provincial jurisdictions and is likely to be slow and difficult

**Provincial Opportunities**

The various provincial statutes in Ontario and Quebec offer certain opportunities for the virtual elimination of persistent toxic chemicals. These are, almost without exception, media-specific opportunities currently requiring site-specific assessment and control. Current mechanisms include Certificate of Approval and Control Order systems (not in use in Quebec), which could be made more explicit, more stringent, more comprehensive (in terms, for example, of requiring specific management practices), and so on. However, these opportunities are limited and in any case demand considerable resources for review and implementation. The final products have the potential to vary from facility to facility, from jurisdiction to jurisdiction, and even within a jurisdiction, and may therefore not be wholly satisfactory.

The MISA and CAP programs in Ontario, and the Quebec IWRP program, have the potential to impose specific and consistent numerical limits on point source dischargers. In Ontario, at least, it is proposed that these limits will be administered under the existing C of A and Control Order systems, again to provide for site-specific "fine tuning".
Question 2b: How might the regulatory framework be reformed or reapplied to improve the ability to virtually eliminate inputs of persistent toxic substances?

All the available regulatory framework could be strengthened to improve our ability to virtually eliminate inputs of persistent toxic substances.

CEPA and the Fisheries Act contain lists of limited parameters. Both lists could be longer and, in the case of CEPA, could include also provisions for specific products of concern. Where processes may be limited, directly or indirectly, those limits should be explicit and stringent. (Considerable concern has been expressed by a number of stakeholder groups that forthcoming regulations under CEPA for the Pulp and Paper Sector will be less extensive and less stringent than those made in Ontario under the EPA. This situation is confusing for all concerned, offers industry the opportunity to complain and delay, and will undoubtedly create complications for monitoring and enforcement of both sets of regulations.)

In Ontario, the EPA could be strengthened through changes mentioned above with respect to the contents of Certificates of Approval and Control Orders, but also through explicit prohibition of inter-media transfer of toxins.

"Best Management Practices" could (and probably will) be required by the MISA regulations under the Ontario EPA. These could include provisions for product reformulation, operator certification, whole-facility auditing/reporting, better housekeeping measures, and so on. Such provisions may, however, need to be made on a case-by-case basis under control documents; it may be impossible to require a single set of "best" management practices, even for a particular industrial sector. (It may be almost impossible to require a whole-facility audit for agricultural operations, given the many exemptions granted agriculture under the various statutes; see below.)
There is not currently an equal level of enforcement of all environmental statutes because of these jurisdictional problems. The Ontario Ministry of Natural Resources is responsible for most Ontario administration of the federal Fisheries Act, but also (possibly as a link to the Fisheries Act) conducts some enforcement of discharge limits. The Ontario Ministry of the Environment informally has responsibility for prosecution of discharge exceedances under the Environmental Protection Act and the Ontario Water Resources Act, but may also prosecute offenders under the Fisheries Act. A more consistent approach to enforcement may, in the view of some contacts, give the existing legislation more "teeth".

This problem of "who's minding the store" has recently been exacerbated by an apparently sudden increase in interest on the part of Environment Canada in regulation writing, monitoring, and enforcement of pollution control activities. Over the past twenty years, the provinces have taken a strong lead in pollution control, while the federal government has provided funding and technical support for those activities. Indeed, even federal statutes such as the Fisheries Act have been enforced by the provinces through agreements (which include provisions for funding) such as the Canada-Ontario Agreement.

In the last year, the development of the federal Green Plan, an increase in regulation-writing activity (e.g. for the Pulp and Paper Sector, under CEPA), and statements by staff to the effect that the federal government intends to be much more active in enforcement and prosecution, have complicated the picture further. Industry is concerned that it may have to answer to two levels of government with different expectations. Considerable potential exists for duplication of effort and consequent wastage of precious human and fiscal resources. There remains considerable uncertainty as to how such a new regime might operate: who will do what?

In summary, a serious "gap" or unfilled need exists with respect to clear delineation of responsibilities on the part of the federal and provincial governments and thus, through the provinces, on the part of the municipal governments.
Communication Among Laws and Among Environmental Media

One of the most challenging aspects of implementing virtual elimination is the need to have "cradle to grave" control over discharges. This would include discharges that could arise anywhere in the following sequence:

- **Genesis (Raw Material Extraction/Refining)**
- **Transportation**
- **Manufacturing**
- **Intermediate Use/Manufacturing**
- **End Use**
- **Product Disposal/Stewardship**

Accidental or intentional releases along this sequence could affect (and have affected) ambient air quality, water quality, aquatic sediment quality, biological tissues, groundwater, and various intermediate vectors including urban storm runoff, agricultural drainage, and "toxic rain".

The current Canadian regulatory framework fails signally to provide integrated control over the extraction/use/disposal steps listed above, and over the several environmental media potentially affected by any single release. For example, the use and labelling of pesticides (a group of products) are regulated under the federal Pest Control Products Act and in Ontario under the Pesticides Act. Their production is controlled primarily under provincial legislation on a site by site basis, for instance through media-specific Certificates of Approval and Control Orders under the Environmental Protection Act. Parameters controlled
for air releases are not necessarily those controlled for effluents, nor those controlled for wastes—even when media-specific regulations exist under the same piece of legislation, as they do for air (Reg. 308) and waste (Reg. 309) under the EPA. (Sewer use controls under MISA will need to be integrated with waste controls under regulation 308, and with municipal by-laws. At present, this "dialogue" appears to be a serious obstacle to implementation of model sewer use by-laws and of sewer use controls in general.)

There is no requirement in law or policy that every step of the "cradle to grave" cycle will be controlled (although CEPA provides broad implicit authority to do this), and no requirement that controls on one medium must be matched with, or even compared to, those for another. As a result, effluent dischargers see no problem in "air stripping" volatile chemicals from water effluents into the air, or in converting a compound into another form for discharge into another medium.

As one industrial manager said at a recent MISA meeting, "If I clean up the water, I should get credit for it. As long as I'm meeting my air controls, you shouldn't care how I achieve that result." He had been speaking about a pollution control strategy for his facility which would involve removal of ammonia from effluent streams, conversion of it to nitrate, and discharge of that compound into some other medium or product. The fact that total nitrogen loadings from the facility would not change was of no importance to him. While this example deals with a so-called "conventional" parameter, it is indicative of the regulatory problem that exists, and the mentality that has arisen around that system. There is therefore a strong need for whole-facility auditing and monitoring. The data bases compiled under MISA and CAP will help us understand what is present in water and air effluents, but much more needs to be done to develop an integrated understanding of, and controls for, whole facilities.
The lack of regulation of particular products, where those products are themselves hazardous (e.g. mercury-containing batteries) is another clear gap. Long-term liability for such products is not clearly defined in Canadian environmental law, creating the potential for serious waste management problems. Although long-term management of some toxins is covered under specific regulations (for example, for PCBs under CEPA), many others remain unresolved. One such example would be the manufacture, sale, and disposal of refrigerators containing CFCs, or automobiles containing various toxic fluids. Another example would be the manufacture of automobile air bags containing problem chemicals (sodium azide?). The manufacturer may produce a potentially toxic product without a significant effect on air or water emissions during the manufacturing process. The user may house and use the product equally safely. But when the product is abandoned, the liability for control of emissions from it rests apparently with the municipality handling the waste disposal. There may therefore be a need for "product stewardship" in the longer term.

Clearly, serious gaps exist in the ways existing regulations "talk" to each other, and in the ways they manage inputs to and from various environmental media. This problem exists within individual statutes (an excellent example is the Environmental Protection Act), but also between statutes (for example, between CEPA and the EPA). Of all available mechanisms, CEPA potentially offers the best integration of sources and sinks, but its authority is largely untested.

The Concept of an "Acceptable" Level of Pollution

As discussed in Section 1.0 above, much of the Canadian federal and provincial regulatory framework has grown up around the concept of "assimilation capacity". These laws were developed at a time when "pollution" meant releases of what we now call "conventional" parameters from point sources.

These ideas have less utility in a society concerned with persistent bioaccumulative substances, which are never truly "assimilated", and with contributions to and from diffuse sources such as runoff, groundwater, and the atmosphere.
This approach has led to fundamental gaps in the logic of the regulatory framework. In virtually all cases, (probably now excluding CEPA), the regulatory framework does not permit us to question the use of a particular substance or to require substitution of other, less polluting, materials. Controls may be imposed on discharges from a facility, usually under site-specific control documents that require considerable resources to generate and track. But upfront controls—"bans"—may be much more difficult to impose. Frameworks do not exist, for example, to require full-facility audits combined with risk assessment, so that source reductions ("pollution prevention") strategies can be developed consistently and comprehensively. The present regulatory framework does not, in effect, facilitate asking the question "why are we using this chemical at all?". This "gap" is a broad and philosophical one, and perhaps one not well suited to band-aid measures or legal tinkering with existing statutes.

(It is interesting to note that the requirement to demonstrate an adverse effect under the Ontario EPA means that prosecutions must be "air tight". To have proof of a spill under the "Spills Bill", three samples must be taken and must contain the deleterious substance. This leads to intentional delay in reporting a suspected spill: companies will often wait a day or two for the spill to disperse before reporting it to the Ministry. While they may later be charged and prosecuted for non-reporting, the penalties they pay are less than those for a negligent spill. It must be noted that "peaks" or "slugs" of high concentration discharges, however brief, are of serious concern in water quality management. Yet this legal dilemma makes it difficult to catch offenders responsible for such spills.)
Non-Point Sources, Groundwater, and "In-Place" Pollutants

According to Hunter (1987):

Provincial and federal legislation respecting water impairment from non-point sources may be sufficiently general to limit pollution. However, there is no legislation specifically directed to pollution from non-point sources.

Similarly, Hunter found no specific provisions in Canadian environmental law to govern the atmosphere as a source of pollution—merely as the recipient of emissions. Groundwater, like the atmosphere, may be better characterized as a carrier of pollutants rather than as a source. Hunter also notes that there is no specific federal or provincial legislation application to in-place pollutants such as contaminated sediments.

Question 3b: Can these gaps be filled within the existing framework? How?

Constitutional Issues: "Who's Minding the Store?"

Constitutional reform would of course permit clearer definition of the responsibilities of the federal and provincial governments with respect to the environment. Such reform is, however, a major and probably unlikely undertaking.

In lieu of fundamental constitutional reform, it may be possible to articulate authority more clearly in federal and provincial statutes.

For example, Section 2(c) of CEPA states that it is the duty of the Government of Canada to "endeavour to act in cooperation with the governments of the provinces to protect the environment".
Section 6(1) provides for the establishment of a "framework for national action and taking cooperative action in matters affecting the environment and for the purposes of avoiding conflict between, and duplication in, federal and provincial regulatory activity" through a federal-provincial advisory committee to advise the federal Minister of the Environment on specific regulations made under paragraph 34 "and other environmental matters that are of mutual interest to the federal and provincial governments".

Finally, Section 8(3) states that "In carrying out [these] responsibilities...the Minister may "consult with the government of any province, any government department or agency, or any person interested in the quality of the environment or the control or abatement of environmental pollution. Similar authority is given to the federal Minister of Health and Welfare, but specific mention is not made of the many other departments that might be affected.

CEPA might be amended in any of these specific Sections, for example, to clearly articulate areas of authority. For example, it could be made clear that while CEPA provides the regulatory authority to create regulations governing products, processes, and specific substances, and the responsibility for writing those regulations thus rests with the federal government (alone?), all enforcement and prosecution activity will be delegated to the provinces under designated agreements (e.g. the Canada-Ontario Agreement).

It is not clear to me whether such action would require also the repeal of provincial legislation such as EPA and the OWRA, or even whether such action would therefore even be feasible. As noted above, some contacts believe that a simple review and revision of enforcement practices would give the existing legislation more "teeth" and make it more intimidating to offenders. This view may be optimistic, however, in view of the complexity of the jurisdictional questions.
Communication Among Laws and Among Environmental Media

Filling the "gap" of communication among laws and among environmental media may be the most serious challenge facing the implementation of virtual elimination. As discussed above, the vast majority of existing environmental legislation is medium-specific. Even laws like the Ontario Environmental Protection Act which appear to cover a broader range of concerns have regulations written for specific environmental media.

This is therefore not a situation that can be easily "patched" or tinkered with. CEPA provides for cradle to grave management of toxins, but expansion of its very brief list of regulated parameters may take considerable time and money.

Medium-specific regulations could be amended to state explicitly that transfer of pollution to another medium is unacceptable. Indeed, this is the intent of the MISA regulations to be written under the EPA in Ontario. But since even these regulations will be administered through the existing Certificate of Approval/Control Order system, attention may also have to be paid to the contents of site-specific control documents. This may have significant implications in terms of the human and fiscal resources needed to review applications and draft such documents (not to mention enforcement of their contents!).

"Product stewardship" presents special problems for control, although again CEPA's broad authority, for example under Section 34 (various subsections), presumably allows the federal Minister of the Environment to create such regulations. Some voluntary initiatives are already in place. Dow Chemical, for example, has begun a product stewardship program, under which they will buy back excess products from their customers. They are also considering policing their customers to ensure that products are used and disposed of in acceptable ways.
The Concept of an "Acceptable" Level of Pollution

With the probable exception of CEPA, the present regulatory framework does not encourage us to think in terms of pollution prevention and source reduction. As in the issue of inter-media transfer, this "gap" is a broad and philosophical one, and may be difficult to repair with legal tinkering.

Regulatory authority clearly exists under CEPA and probably under other statutes (e.g. Section 136 of the Ontario EPA) to require the audit of industrial (and other?) facilities. With sufficient political will, this authority might be translated into regulations requiring, for example, pollution prevention plans or water conservation plans. Statutes such as the EPA place the burden of proof of harm on the part of the Ministry. However, if it could be demonstrated that a matter was of universal concern (for example, the need for water conservation and full-cost pricing in Ontario), sufficient "proof" of need might exist to allow such regulations to be created.

CEPA's broad authority may offer a basis for the "paradigm shift" needed to fill this philosophical "gap".

Non-Point Sources, Groundwater, and "In-Place" Pollutants

According to Hunter (1987), groundwater and atmospheric sources of pollution may be better considered as carriers of pollutants rather than as a source. Certainly, control of either groundwater or atmospheric sources is akin to controlling the quality of the ambient environment, and will carry some of the same concerns: difficulty in differentiating sources, difficulty in attributing "ownership" of pollution, therefore considerable difficulty in effecting any improvement.

In view of these concerns, it may be preferable to control the sources (point or non-point) to either vector, and to place controls on the quantity and nature of their use.
An interesting problem arises also with respect to pollution arising from agricultural activities, because of the many exemptions given to those activities throughout the environmental legislation. For example, Section 8 of the EPA expressly exempts plants, structures, etc. used in agriculture from the Certificate of Approval process. A farm operator therefore does not have to seek formal approval to use a particular method (for example for manure storage). Similarly, Regulation 308, Part V, under the EPA exempts farming wastes from normal waste management provisions. However, if a problem can be demonstrated with that practice, it can be dealt with after the fact by a Director's order. A case arose recently in North Bay, Ontario, where a farmer was creating downstream water quality problems by allowing his cattle to have free access to a stream running through his property. He was ordered to fence the stream and limit cattle access by an order issued under Section 6 of the Environmental Protection Act. A Director may also require that preventive measures be taken, under Section 17 of the same Act.

Finally, it would be almost impossible to require farmers to use a particular practice or piece of equipment (for example a chisel plough or other "conservation" plough), or to ban the use of unacceptable practices or implements, because the statute gives authority only to control emissions, not devices or practices (whether agricultural or otherwise) which might facilitate pollutant release or transfer. Controlling pesticide losses from farmland may thus be an onerous task in law, unless the pesticide itself were to be banned.

Control of in-place pollutants is possible under the Fisheries Act and under the Ontario EPA; dredging activities are controlled under these statutes, under the (federal) Navigable Waters Protection Act, and under the Ontario Beach Protection Act. Presumably, the broad provisions of CEPA would also allow for control of sediment-bound pollutants and even of contaminated biological tissue. It is important to note, however, that the site-specific nature of many in-place pollutant problems (e.g. current patterns, adjacent structures and uses, etc.) may require site-specific control documents.
Question 4: What new legislative and regulatory directions are required, that is, outside the present framework?

To summarize the concerns expressed in the above sections, a "perfect" regulatory framework for virtual elimination would include:

- whole-facility auditing and whole-facility pollutant discharge limits
- cradle to grave control over the full cycle of raw materials genesis, processing, product use and storage, and waste disposal
- product stewardship
- provision for other unknown sources (e.g. natural sources, in the case of mercury) and "uncontrollable" sources or vectors such as groundwater

There appears to be a lack of, and a need for, an overall coordinated strategy for the reduction of use of particular chemicals. This may need to be achieved through several programs or regulations, potentially encompassing:

- bans or phase-outs of particular problem substances, processes, and products
- quantitative limits for all media
- quantitative limits for all (types of?) discharge
explicit control over the handling of persistent toxics from "cradle to grave", possibly through a waybill system such as is used in Regulation 308 under the EPA for the control of waste in the province

Changes of this nature challenge the very fundamentals of Canadian and provincial environmental law. They would need not only comprehensive and potentially lengthy consultation with international, national, provincial and municipal governments, industry, and the public, but also new systems to be developed, for example to define which substances/products/processes should be banned, and which merely controlled. There would be a need, in other words, to define closely the meaning of "persistent toxic", and to have that definition accepted by a wide range of stakeholders.

Such a program would also necessitate a comprehensive knowledge of the quality of all pollutant sources to the environment (potentially including intermediate vectors such as groundwater and the atmosphere), and this knowledge is sadly lacking at present. While MISA and CAP will be important in developing that understanding in Ontario, the same cannot be said for other media in that province, nor for any media in any other province or federally.

Some of the discharges to a given area come from diffuse sources (air, groundwater, in-place pollutants, urban and agricultural runoff) for which it is difficult to attribute ownership and therefore to impose controls. Some of these sources (for example, contaminated biological tissue) may, in a practical sense, be "uncontrollable". Yet in some cases (for example, PCB in contaminated sediments), contributions from these sources can be a significant portion of the total. There is a need to know not only the total pollutant loads from individual facilities (and perhaps the contributions of individual pipes and smokestacks), but also what proportion those loads form of the total pollutant contribution to an area. We need, in other words, to understand the relative contributions of all sources to an area.
Complicating this problem is the fact that some of those loads will come from other jurisdictions. For example, PCB loads from sources on the Canadian side of the St. Lawrence have been reduced to zero (it is believed), but ambient concentrations continue to remain high on the Canadian side. The reason for this appears to be contributions of PCBs from three sources on the U.S. side of the river.

As noted in Section 2.0 above, imposition of more stringent environmental controls in Canada will undoubtedly demand stronger transboundary laws and multinational agreements regarding transboundary transport of pollutants and to ensure consistency of limits. While the controls anticipated for the petroleum sector under MISA are expected to be economically feasible, the same cannot be said for air controls under CAP. In at least one author's view,

The passage of Ontario's proposed amendments to its Regulation 308 could place some Ontario business sectors at a competitive disadvantage relative to their U.S. counterparts, if Ontario moved well in advance of the U.S. This disadvantage would be eliminated only if the U.S. federal government, or a large number of States, accelerated their consideration and passage of air toxics regulations. (Hickling 1990)

Several contacts have noted that "laws aren't everything", however. We may do better in the long run to make modest changes to the regulatory structure while imposing economic constraints on polluters, or by subsidizing good performance. Several examples come to mind: full-cost pricing of water and sewage services would force users to pay the full cost of the resources they use. In Sweden, battery manufacturers who use mercury in their products must carry a hefty surtax on those products—roughly an additional dollar per battery in Canadian funds. This approach puts the onus on the manufacturer to control costs to stay competitive, and thus indirectly can lead to product reformulation and pollution prevention.
Question 5: Does the present framework facilitate an integrated multi-media approach to management of persistent toxic substances? Provide examples of such successful management, and examples where the legislative and regulatory framework has resulted in the shifting of pollution from one medium to another.

I have discovered no examples of an integrated multi-media approach to the management of persistent toxic substances in the environment. I must therefore conclude that the present framework not only does not facilitate such an approach, but may in fact hinder it.

The Great Lakes Water Quality Agreement, with its consideration of other media than water, may provide a possible model for such multi-media management, but even it is deficient in some aspects (e.g. groundwater) and in any case appears to lack the necessary authority to effect change.

Federal Health and Welfare considers total body exposure to certain chemicals in setting guidelines, for example for drinking water. Drinking water is estimated to comprise about 20% of an average person’s total exposure to toxins, with the remaining 80% being derived from food and air. However, the guideline-setting process does not (to my knowledge) encompass a comprehensive assessment of all possible vectors. Rather, crude estimates of dose fractions are derived, and guidelines established for each in isolation from the others.

As discussed in several sections above, there is reason to expect that transfer to other media in order to meet particular control limits is more the rule than the exception. The practice seems, in fact, to be entrenched in the thinking of senior environmental managers from major industrial sectors. This, in itself, is a considerable hurdle to overcome.
Finally, the longstanding media-specific approach of environmental legislation is clearly reflected in the media-specific structures of government. It is perhaps unreasonable to expect that multi-media management could be easily undertaken in an environment where all the research, all the money, all the personnel, and virtually all the consultation is divided along media lines. When several departments of government, and several levels of government, also are involved, the problem becomes more intractable still. We are lucky if water researchers in one department, at one level of government, talk to other water researchers in other departments. Conversations about water management between levels of government are rarer still, and "ecosystem" discussions involving all levels of government and multiple departments are almost non-existent.
Question 6: What are the barriers to development and application of a necessary and sufficient legislative and regulatory framework? Can these be overcome?

There are several major barriers to the development and application of a good regulatory framework for virtual elimination. Most of these have been discussed above, and I will summarize them below:

**General:**

- Jurisdictional questions as to who does what (or who should do what) arising from a lack of clear authority in the Constitution Act

- The need for consultation among several levels of government; this could become a major obstacle in the case where different political regimes are in power in different jurisdictions (for example, conservatives in power at the federal level, other parties at provincial and sometimes municipal levels)

- Established "territories" in government, for example the longstanding tradition of provincial control over pollution e.g. Ontario, has led to the building of large and complex infrastructures (which are not necessarily matched in the regional offices of the federal government); switch of primary role to the federal government would have serious implications for both levels of government
National Issues:

- issues surrounding the potential for sovereignty of Quebec, and their potential impact on pollution control and environmental management (separation of Atlantic provinces from the rest of Canada; potentially different legislative framework in Quebec, etc.)
- laws must be similar across jurisdictions; this may be manageable within Canada but could be considerably more difficult in dealing with other nations, particularly when such agreements may have implications for trade.

Provincial Issues:

- there may be a problem in supplying the vast human and fiscal resources required to support a system based on site-specific controls and control documents
- changes in regulatory structure may require unforeseen changes to "non-environmental" laws such as the Municipal Act, to change the powers of municipalities in carrying out pollution investigation/abatement work
- there is a problem with longstanding exemptions for agriculture, which may be a significant source of or vector for certain persistent toxics
the need to demonstrate proof of harm under the Ontario EPA means that most prosecutions must be undertaken against present owners of property or facilities; this may complicate site remediation, for example of soils contaminated with PCBs (although some legal authorities believe that it may also be possible to seek redress from previous owners for "retro-active" prosecutions.)
Question 7: What are the social, economic, and political implications of new initiatives, either within or outside the present framework?

Without a concrete proposal to examine, it is difficult to anticipate the social, economic and political implications of new initiatives. Clearly, "turf wars" can be expected within government, but these issues are likely to be trivial compared to some other major concerns.

For some industrial sectors, authors such as Hickling (1990) believe that the costs of compliance with stringent controls may be insupportable, and placing the sector at a considerable competitive disadvantage unless equally stringent controls are adopted by the jurisdictions where their competitors are located. This appears to be a more serious problem for air controls than for water controls. In general, however, Hickling believes that the major tax program (an accelerated capital cost allowance) aimed at compliance costs which is available to Canadian jurisdictions offers Canadian firms a significant advantage over many other nations.

As mentioned in several places above, jurisdictional wrangling over current issues, and potentially over the form of a new framework, will continue to be a problem without constitutional reform.

Nevertheless, a new framework could provide for more consistency in pollution control among the provinces, and thus among municipalities. A more equitable system would also reduce the apparent advantage of relocation to jurisdictions with less stringent controls, and the economic and social problems that arise from those decisions.
Finally, a new framework could provide for a more active role for the public in decision making, for example with respect to the setting of environmental and human health standards. Certainly, the existing system has been largely closed to public input, with a resulting loss of public confidence and "dialogue" among stakeholders.
3.0 SUMMARY AND CONCLUSIONS

To restate ideas contained above, a "perfect" regulatory framework for the implementation of virtual elimination would contain the following elements:

- whole-facility auditing and whole-facility pollutant discharge limits
- cradle to grave control over the full cycle of raw materials genesis, processing, product use and storage, and waste disposal
- product stewardship
- provision for other unknown sources (e.g. natural sources, in the case of mercury) and "uncontrollable" sources or vectors such as groundwater

Much of Canadian federal and provincial law instead has the following characteristics:

- reactive, not preventive: harm must occur, or be likely to occur, before any action can be taken
- based on the idea of "assimilation capacity" rather than "pollution prevention"; consequently some steps between "cradle" and "grave" are not well controlled
- strongly media-specific (with the possible exception of the Canadian Environmental Protection Act), and without the requirement that controls on different environmental media be coordinated
often site-specific, requiring vast quantities of human and fiscal resources to assess, review, generate approvals, track compliance, and undertake enforcement and prosecution.

- **Jurisdictionally complex**: the authority to write regulations rests with both levels of government, and the responsibility for enforcement is divided inconsistently among federal and provincial agencies, and among different departments at the same level of government.

There appears to be a lack of, and a need for, an overall coordinated strategy for the reduction of use of particular chemicals. This may need to be achieved through several programs or regulations, potentially encompassing:

- bans or phase-outs of particular problem substances, processes, and products
- quantitative limits for all media
- quantitative limits for all (types of?) discharge
- explicit control over the handling of persistent toxics from "cradle to grave", possibly through a waybill system such as is used in Regulation 308 under the EPA for the control of waste in the province

However, considerable legal authority exists, to undertake controls of virtually any kind. The most powerful tool potentially exists in the Canadian Environmental Protection Act, which despite two years on the books is largely untested as a regulatory tool.
Many "band-aid" measures are available to improve the effectiveness of existing legislation. These could include additions of language precluding inter-media transfer of pollutants, improvements in the planning and execution of enforcement activities, and the writing of explicit regulations to address specific problems. Some actions, for example the banning of specific pieces of equipment or processes, may be possible only at the federal level, under CEPA, if at all.

A more satisfactory approach might be comprehensive regulatory review and reform, perhaps coupled with constitutional changes to articulate the roles and responsibilities of the federal and provincial governments more clearly. CEPA could then provide the basis upon which pro-active, media-integrated regulations could be built. This task, however, is likely to be a lengthy and onerous one requiring input from dozens of departments at several levels of government, from a wide range of industrial and municipal stakeholders, and from the public. It is not clear that the political will exists at any level of government to undertake such a task.
LIST OF CONTACTS:

I am particularly grateful for the assistance of David Langlois, a third-year student at the University of Toronto, who painstakingly itemized relevant sections of the various statutes, and also conducted several interviews on my behalf.

Mr. Paul Muldoon
Counsel
CIELAP/Pollution Probe
Toronto, Ontario

Mr. Douglas MacTavish
Regional Director
Ministry of the Environment
Southwestern Region
London, Ontario

Mr. Steven Nutt
XCG Consultants
Kitchener, Ontario

Mr. John Swaigen
Chair
Environmental Appeal Board
Ministry of the Environment
Toronto, Ontario
Mr. Jim Bishop  
Vice-President  
Environmental Protection Laboratories  
Mississauga, Ontario  
(and former Director, Water Resources Branch)

Representatives  
Investigations and Enforcement Branch  
MOE

Mr. Jim Jackson  
Legal Services  
Ministry of the Environment  
Toronto, Ontario

Prof. Donald Mackay  
Dept. of Chemical Engineering  
University of Toronto  
Toronto, Ontario

Dr. Tom Brydges  
LRTAP Coordinator  
Atmospheric Environment Service  
Environment Canada  
Toronto, Ontario
and many contributions from members of federal and provincial agencies, and of industrial and public interest organizations, who wished to remain anonymous.
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