Alternative Strategies to Reduce Effects of Persistent Toxic Chemicals in the Natural Environment: A Great Lakes Regional Perspective

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I. INTRODUCTION

The Great Lakes region is unique on virtually any national or global scale. The freshwater of the Lakes represents nearly 20% of the world’s total supply. The Lakes also offer abundant high quality water suited for a variety of uses, exceptional recreation, as well as effective shipping. This region’s share of manufacturing output significantly exceeds that of the rest of the United States and Canada, making the Great Lakes the manufacturing nucleus of the North American continent. Further, nearly a fifth of the U.S. and a third of Canadian total populations live in this region.

The Lakes’ long residence times, coupled with increasing land-use pressures, have allowed the Lakes to accumulate persistent toxic chemicals over their development history. Although the past two decades have brought remarkable improvement as a result of infrastructure investment and significant technology change, there is continued concern about accumulation of persistent toxic chemicals in the ecosystem and the need for cost-effective clean-up strategies. Some of this change was driven by the Canada/U.S. Great Lakes Water Quality Agreement (GLWQA).¹

Part I of this essay will discuss the 1978 GLWQA, with emphasis on the topics of zero discharge and virtual elimination. Part II will describe a number of voluntary industry initiatives, as well as industry and other stakeholder partnerships, specifically directed at reducing effects of persistent toxic chemicals on the environment.

II. THE GREAT LAKES WATER QUALITY AGREEMENT

A. Purpose and Strategy

The GLWQA's stated purpose is "to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem." To accomplish this, the two governments agreed to "eliminate or reduce to the maximum extent practicable the discharge of pollutants into the Great Lakes System." They also agreed on the policy that "[t]he discharge of toxic substances in toxic amounts be prohibited and the discharge of any or all persistent toxic substances be virtually eliminated."

In order to meet the Agreement's states goal of "[protecting] human health and . . . [ensuring] the continued health and productivity of living aquatic resources and human use thereof." The two countries also agreed to adopt regulatory strategies for virtual elimination that include:

- A philosophy of zero discharge "for the control of inputs of persistent toxic substances," as well as

- Pollution prevention strategies that include "reduction in the generation of contaminants" through alternatives such as reduction of toxic waste volumes, quantities, and toxicity, "wherever possible."

In Canada, the Agreement is being implemented primarily through a regulatory process, the Municipal and Industry Strategy for Abatement (MISA). In the United States, implementation vehicles include both legislation and regulation such as the 1990 Federal Great

2. Id. at art. II.
3. Id.
4. Id.
5. Id. at Annex 12(2)(a)(i).
6. Id. at Annex 12(2)(a)(ii).
7. Id. at art. 6.
8. Id.
Lakes Critical Programs Act, and the Great Lakes Water Quality Initiative, the latter of which proposes discharge criteria for persistent bioaccumulative toxic chemicals.

B. The Zero Discharge/Virtual Elimination Debate

Although the Agreement referred to zero discharge as a "philosophy" rather than a strategy to be literally applied, no clear definitions of either zero discharge or virtual elimination were provided, thus fostering debate for more than a decade. Zero discharge as an end-of-pipe strategy is clearly impracticable. The presence of chemicals in influent waters from both natural and man-made sources precludes achievement of zero discharge levels, because no treatment process can accomplish complete and absolute removal. In addition, as analytical capabilities continue to improve, a requirement of zero would force dischargers to meet increasingly stringent limits that extend beyond what is needed to protect health and environment, at costs far exceeding benefits.

The blanket extension of a zero discharge strategy, or even a zero use strategy, to broader categories of chemicals, even those that are synthetic pathway precursors, poses a concern that risk/benefit may not be adequately addressed (e.g., chlorination of drinking water, or pharmaceutical drugs). Use prohibitions or bans are only one of a broad spectrum of alternatives and thus should be, and have been, limited to a small number of chemicals for which risks clearly exceed benefits (e.g., PCBs and several persistent pesticides).

On the other hand, virtual elimination of unacceptable discharge levels of toxic substance inputs can be achieved through pollution prevention, which focuses on a wide array of options such as source reduction, replacement, recovery, and reuse. Pollution prevention provides flexibility so that such reductions or replacements can be phased-in, providing time to develop new technologies and products. It also provides a framework within which to integrate environmental, social and economic issues, as well as to develop a path that provides the greatest good for society. A variety of voluntary pollution prevention

III. STAKEHOLDER PROCESSES

A. Processes Addressing Virtual Elimination

A number of stakeholder-driven initiatives have addressed development of strategies for persistent toxic chemicals, in an attempt to clarify the zero discharge/virtual elimination debate. For example, during the late 1980's, the Canadian Chemical Producers Association developed the following recommendations:

- A prioritization process should be developed for chemicals based on toxicity, persistence, and bioaccumulation potential.

- For persistent, bioaccumulating toxic chemicals:
  - where acceptable substitutes are available, their use should be phased-out where risks clearly outweigh benefits
  - where substitutes are not immediately available, an interim strategy should be adopted, viz., the responsible application of treatment technology and continued investigation of acceptable substitutes and processes.

- For persistent non-bioaccumulating toxic chemicals, good science should be used to set discharge standards, consistent with protection of public health and environment.

In 1990, this position statement became the basis for discussion by a newly-formed coalition of leaders from advocacy groups and presidents of a number of Canadian firms. Based on its discussions, the group developed a series of recommendations to reduce and, in some cases, eliminate toxic substance emissions. The group's position in turn became the basis for a Canadian federal government multistakeholder process (ARET, Accelerated Reduction and Elimination of Toxics), the intent of which is to develop an implementation program.

A multistakeholder Task Force created by the International Joint Commission's (IJC) Water Quality Board is also attempting to develop consensus positions on virtual elimination and zero discharge, as well as
potential implementation strategies.\textsuperscript{11} To date, multistakeholder groups have had difficulty in reaching agreement, particularly in the area of developing consensus implementation strategies.

The level of debate on zero discharge/virtual elimination was again elevated in 1992 following the publication of the International Joint Commission's Biennial Report.\textsuperscript{13} This Report recommended the ban or phaseout of not only persistent toxic chemicals, but also chlorine (which is not a persistent, bioaccumulative chemical) as a feedstock for industrial processes.

There is a great need for resolution of this debate. Because of the profound implications of policy choices in this area, it will be important for stakeholders involved in such consensus processes to have access to sound scientific information on environmental and human health effects of persistent toxic chemicals, as well as valid information on the economic and social consequences of approaches such as zero discharge, zero use and virtual elimination. Stakeholders should also have a more realistic sense of what has actually been accomplished based on previous voluntary, legislative, and regulatory efforts, as well as the level of investment in change. It is certain that this information has not been as clearly communicated as has the debate and rhetoric on zero discharge and use.

\textbf{B. Voluntary Pollution Prevention Efforts}

Today, public policy choices and private interest initiatives based on a voluntary pollution prevention approach are reducing materials and energy usage and waste levels.

Many firms have announced voluntary pollution prevention programs beyond what is required by law. Many of these programs have been widely shared by the business community through conferences, publications, clearinghouses, and training programs. Their dissemination to the public through the media has been less successful (good news is rarely newsworthy), and new outreach vehicles clearly need to be developed.

\textsuperscript{11} The IJC was established in 1912 to address boundary water disputes in accord with the 1909 Boundary Water Treaty between Canada and the U.S. Treaty Relating to Boundary Waters and Boundary Questions, Jan. 11, 1909, U.S.-Gr.Brit. (for Can.), 36 Stat. 2448. The IJC is composed of six Commissioners, three each from the U.S. and Canada.

\textsuperscript{12} \textsc{International Joint Commission, Sixth Biennial Report Under the Great Lakes Water Quality Agreement of 1978 to the Governments of the United States and Canada and the State and Provincial Governments of the Great Lakes Basin 52 (1992).}
These voluntary business-based programs are in turn reducing and in some cases virtually eliminating risks. A 1991 Forum on Great Lakes Pollution Prevention Accomplishments, sponsored by the Council of Great Lakes Industries at the IJC 1991 Biennial Meeting, documented the significant technical and capital investments made by industry in this area.

For example, Dow Sarnia and Alberta operations have made large capital investments to separate streams with toxic contaminants from discharge waters. Both the Canadian and U.S. pulp and paper industries have invested significantly to reduce dioxin levels to nondetectable levels in mill effluents and significantly reduce other chlorinated organics.

Discharge volumes from Stelco's new state-of-the-art steel mill on Lake Erie are reduced by 90% compared with older mills, and contaminants are virtually eliminated from the discharge stream. A Dofasco steel mill has minimized toxic emissions by installing closed-loop processes in some manufacturing areas.

In 1990, both the U.S. Environmental Protection Agency and Environment Canada announced separate agreements with the auto industry to develop emission reduction strategies for a list of about 70 persistent toxic chemicals. This program involves not only the automakers, but also their suppliers. Industry and government are developing methods to analyze product lifecycles, including the true cost of materials and operations. Life cycle analysis is a newly emerging technical tool, evolving with use.

Effective environmental management processes and systems are another key element of stewardship, recognized by businesses that accept their role as integral members of local and world communities. Programs such as Responsible Care, created in Canada by the Canadian Chemical Producers Association and transferred to a number of other countries, including the U.S., provide a credible management framework. Under this program, the chemical industry pledges to develop, manufacture, transport, and use chemicals responsibly. This industry also pledges to practice sound waste management, including implementing waste reduction programs. Corporate culture and behavior are beginning to change as a result of such programs.

Other associations have created consensus principles and measures of performance for environmental management, such as the International Chamber of Commerce's Charter for Sustainable Development. The United Nations' Center for Transnational Corporations has published Criteria for Sustainable Development Management to strengthen participation of large industrial enterprises...
in environmental preservation and protection. The Council of Great Lakes Industries has developed a self-assessment matrix that can be used as a guide to both implement and measure environmental management excellence. This matrix is part of a Baldrige-type quality environmental management award being developed by the Council of Great Lakes Governors.

C. Government-initiated Regulatory and Voluntary Approaches

For many decades, government has been in the business of setting environmental standards with the mission of protecting health and environment. These standards may be modified, consistent with the body of knowledge and good science that supports standard-setting. As our understanding of our environment has progressed, tools such as risk assessment and management have been developed, which are also important elements of environmental management.

Within the past few years, governments have also begun to recognize the effectiveness of voluntary solutions. At the IJC’s 1991 Biennial Meeting, U.S. EPA Administrator William Reilly and Minister of Environment Jean Charest publicly expressed the satisfaction of both governments with the high degree of voluntary business initiative and leadership.

D. Integrating Environmental, Economic, and Societal Issues through the Public Policy Process

None of the many initiatives described above would be possible without sustained will, cooperative action, and the application of significant resources. While there are no easy solutions, many of the options available to us are being pursued with energy. However, many other compelling issues face us, such as energy, education, introduction of exotic species, preservation and restoration of natural habitat, and health care.

Given the tradeoffs in managing broad sets of issues in a climate of shrinking resources, we expect that this process and our choices will continue to be difficult. Responsible decision-making will continue to depend on credible science, valid risk/benefit methodologies and data, as well as the broad dissemination of such data to all potentially affected stakeholder groups.

Government and academia will be increasingly called upon to

collaborate in providing objective public policy education in the area of toxic chemical effects and management choices. A number of outreach vehicles already exist that can provide collaborative support. These include for example new national Pollution Prevention Centers at the University of Michigan and in Sarnia, Ontario, as well as an established outreach vehicle, the U.S. Department of Commerce’s Sea Grant Great Lakes Research Network, already active in toxic chemicals research.

Business will need to better communicate to the public its commitment to stewardship, its successes, and its future plans. Scientists from the business community will need to become more involved with other members of the technical and scientific community involved in resolving these issues, and contribute both knowledge and expertise to the development of options and alternatives.

IV. CONCLUSION

Only through such changes can the public policy development process become a truly consensus one. Only through such collaborative approaches will we be able to allocate our limited resources in a way that is consistent with the greatest good of society.