

PUBLIC POLICY ADVISOR

Great Lakes Water Quality Regulation: Past and Present

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Most Michigianians are affected directly or indirectly by the health of the Great Lakes. Industry and municipalities depend on uncontaminated water supplies from the lakes, fishing and tourism businesses rely on the preservation of water quality, and Michigianians enjoy recreational opportunities the lakes provide.

To preserve this great natural resource, many environmental programs, initiatives, and agreements have been put in place to regulate the Great Lakes. The Great Lakes Water Quality Guidance recently drafted by the U.S. Environmental Protection Agency is the culmination of many of these efforts. This report attempts to describe the regulatory history and characteristics of the region leading up to the release of the proposed Guidance and discusses some of the more interesting aspects of the proposed regulations.

BACKGROUND

"Les mers douces"—the sweet seas—is what one European explorer called the Great Lakes, an appropriate description for fresh bodies of water of such size and distinction. The Great Lakes were formed 5,000 years ago by the withdrawal of a huge glacier in the northern hemisphere, leaving large moraines (an accumulation of earth and stones) and five huge holes that have evolved into the five interconnected Great Lakes we see today.

All streams, rivers, lakes, and other bodies of water within the Great Lakes drainage basin make up the Great Lakes system. The system coastline is more than 10,000 miles long and is surrounded by eight states (New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Wisconsin, and Minnesota) and the Canadian province of Ontario. The enormity of the lakes makes them appear to be impervious to damage; history has shown they are not.

Environmental degradation began with the extensive harvesting of timber during early settlement in the 1700s followed by the overharvesting of fish, beginning in the early 1800s. More than 50 percent of the system's natural wetlands have been filled and the natural process for filtering water before it is discharged into the lakes has been significantly diminished.

Current pollution sources include agricultural runoff, municipal wastes, industrial discharges, contaminants percolating from disposal sites, and the deposition of pollutants from the atmosphere. Some pollutants can remain in the system for hundreds of years, up to 173 years in Lake Superior alone, and contaminants can bioaccumulate in lake organisms, reaching concentrations much higher than those in the lake itself. As a result, the Great Lakes states currently have in effect 164 fish consumption advisories throughout the Great Lakes system.

The Great Lakes Water Quality Guidance, released by the U.S. Environmental Protection Agency (EPA) for public review on April 15, 1993, is founded on almost a century of regional cooperation among the eight states bordering the Great Lakes and the Canadian province of Ontario to protect the integrity of the Great Lakes system. The Guidance is part of the United States' effort to protect the Great Lakes (see the box below for a selected list of programs) and breaks from the past by regulating the lakes as a single watershed, considering interstate effects and extending protection to wildlife as well as aquatic and human life. In addition, the Guidance tries to regulate potential toxins where current data are not sufficient to establish specific water quality levels.

Current Environmental Programs Affecting the Great Lakes

Great Lakes Five-Year Strategy: Developed by the EPA and 15 federal, state, and tribal agencies to reduce toxic emissions from all sources in the Great Lakes system.

Great Lakes Pollution Prevention Action Plan: Established by the EPA in response to the Pollution Prevention Act of 1990 to implement and complement pollution prevention efforts, i.e., reducing or eliminating the use of certain pollutants. The EPA has received voluntary nationwide commitments from industry to reduce the emission of 17 priority pollutants by 33 percent by 1992 and 50 percent by 1995.

Lakewide Management Plans: Requirement of the GLWQA, as amended in 1987, to develop management plans for the five lakes to ensure water quality criteria are met and allow regulators to design cost-effective approaches for meeting water quality standards and/or maintaining beneficial uses.

Remedial Action Plans: Requirement of the GLWQA, as amended in 1987, to develop remedial action plans to remediate impairments to the 14 identified beneficial uses in the regional areas of concern.

Contaminated Sediments: Addressed by several federal programs, including the **Assessment and Remediation of Contaminated Sediments Program**, authorized by the Clean Water Act, and a **National Contaminated Sediment Strategy**, being developed by the EPA. These programs emphasize contaminant assessment, remediation technologies, and prevention strategies.

Atmospheric Deposition: Monitored through the **International Surveillance Plan of the Integrated Atmospheric Deposition Network**, a binational program developed by the United States and Canada, and the **Great Lakes Air Deposition network**, part of the **Clean Air Act**. Emissions will be more stringently controlled by the CAA amendments of 1990, including the provision that the EPA must adopt technology-based standards for all sources of the 189 identified toxic air pollutants between 1992 and 2000.

Storm Water and Combined Sewer Overflows: Contaminants from storm water will be reduced due to provisions of the Clean Water Act of 1987, which requires the EPA to develop permit application requirements for municipal storm sewer systems and storm water discharges. Combined sewer overflows (CSOs) will be more regulated by permits required by the **National Combined Sewer Overflow Control Strategy**.

Discharges of Oil and Hazardous Polluting Substances: Are regulated under the **Oil Pollution Act of 1990**. Areas of the Great Lakes that are vulnerable to spills and potential weaknesses in current prevention and response programs are being identified and addressed.

Fish Advisories: A **Fish Advisory Task Force**, with representatives from each Great Lakes state and the EPA, is developing a consistent fish advisory protocol for the Great Lakes.

Environmental Monitoring and Data Management Programs for the Great Lakes: **The Environmental Monitoring and Assessment Program (EMAP)** established by the EPA to monitor a number of factors to provide a comprehensive description of the condition of the nation's natural resources.

Great Lakes Toxic Reductions Initiative Multi-media Management Committee: Established by the EPA and the Great Lakes states to develop an ecosystem approach to eliminate sources of toxic pollutants and emphasize the intermedia transfer of pollutants (i.e., air pollution depositing in lakes and eventually settling in sediments).

Lake Superior Bi-National Program: A joint project undertaken by the United States and Canada to use the Lake Superior basin as a "demonstration area" for zero discharge of contaminants and a broader, ecosystem-based resource management approach.

Saginaw Bay National Watershed Initiative: Funded by the EPA to provide a forum where local, state, and federal agencies and citizens can work together to identify and solve land-use and environmental degradation concerns.

Rouge River National Wet Weather Demonstration Projects: Funded by the EPA to investigate sources of water pollution within an urban watershed caused by rainfall. Existing water quality will be documented, a range of remediation measures will be undertaken, and models will be developed to determine the effects on water quality of these remedial activities.

HISTORY OF REGULATION

In 1909 the United States and Canada signed the **Boundary Waters Treaty** in recognition of the need to take mutual responsibility for protecting the water quality of the Great Lakes. The International Joint Commission (IJC), consisting of three members from each country, was formed to resolve disputes

between the two countries and advise the governments on water pollution problems. In 1970 the IJC conducted a study of Lakes Erie and Ontario and concluded that phosphorus loadings were accelerating eutrophication (the aging process of a lake characterized by the depletion of oxygen in lower depths and the excessive growth of aquatic

plants and algae) of the lakes and encouraged the two governments to establish uniform effluent standards for municipal treatment systems and industries discharging into the Great Lakes.

In 1972 the United States and Canada signed the **Great Lakes Water Quality Agreement** (GLWQA), seeking to establish common water quality objectives for the Great Lakes system. The agreement was subsequently revised in 1978 and 1987 and currently contains 15 articles and 17 annexes, too many to describe here.

The overall goal of the current GLWQA is to "restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin ecosystem." To achieve this goal, the GLWQA provides that

- discharge of toxic substances in toxic amounts be prohibited;
- discharge of persistent toxic substances be virtually eliminated; and
- coordinated planning processes and management practices be developed and implemented by each jurisdiction to ensure adequate control of all sources of pollutants.

One result of the agreement is that numeric and narrative pollutant-specific objectives have been established to maintain minimum water quality levels for the Great Lakes system. For example, the concentration of cadmium, a metal, in an unfiltered water sample is not to exceed 0.2 micrograms per liter to protect aquatic life. The objectives do not preclude adoption of more stringent standards by the participating states and province.

Management and implementation requirements include the development of remedial action plans (RAPs) for areas of concern (AOC) designated by Canada and the United States. An AOC is an area that fails to meet the general or specific objectives of the GLWQA causing impairment of beneficial uses. The RAPs identify any impairments of 14 specific "uses" ranging from restrictions on fish and wildlife consumption to fish tumors or other deformities. In addition, the RAPs identify causes of the impairments and the sources of the pollutants and develop plans for pollution remediation. There are

14 AOCs in Michigan, and most have completed a portion of the RAP process.

In 1986 the governors of the eight Great Lakes states furthered their commitment to regional cooperation in controlling the release of toxic substances into the lakes by signing the **Great Lakes Toxic Substances Control Agreement**. The governors agreed to rely on the permitting process to control toxic releases and work jointly on developing uniform water quality standards for the Great Lakes region.

The preceding regional cooperation and commitment provided the groundwork for the **Great Lakes Water Quality Initiative** (GLWQI) (not to be confused with the GLWQA) created in 1986 by the EPA. The GLWQI is part of the U.S. program to achieve the objectives of the binational GLWQA by providing a forum for the eight states and EPA to develop uniform water quality criteria and implementing procedures for the Great Lakes basin. Participants have grappled with a variety of complex topics, including methods to (1) estimate the persistence and ability of pollutants to bioaccumulate, (2) identify the most persistent pollutants, and (3) determine acceptable maximum daily discharge of pollutants into the Great Lakes.

The control of toxic discharges is a focal point of the GLWQI. Although toxic discharges into the Great Lakes have decreased, current levels exceed concentrations recommended to maintain water quality. Pollutants that persist in the lake system were targeted for regulation due to their potential to cause significant risk to the health of aquatic life, wildlife, and humans inhabiting the Great Lakes region.

There is a growing belief among regulators that it is cheaper to reduce or eliminate the use of particular pollutants than to try to remove the pollutants after they have been released into the environment through waste treatment systems or other remediation methods. The GLWQI promotes pollution prevention by recommending rigorous antidegradation procedures for pollutants with a propensity to bioaccumulate.

The U.S. Congress turned its attention to the water quality of the Great Lakes by passing the

Great Lakes Critical Programs Act (CPA) in 1990. The CPA called for the development of regional water quality guidance criteria (based on those developed under the GLWQA), the establishment of statutory deadlines for the implementation of the guidance criteria, and the increase of federal funding for Great Lakes environmental programs. Great Lakes states are required to adopt the policies once developed.

When the deadlines for development of the EPA Great Lakes Water Quality Guidance, as required by the CPA, were missed, the National Wildlife Federation filed a lawsuit, which ultimately forced the EPA to issue the Guidance in April 1993 for public review.

GREAT LAKES WATER QUALITY GUIDANCE

The proposed Great Lakes Water Quality Guidance is significant for several reasons: (1) It is the result of regional cooperation, (2) it makes enforceable the ideas and criteria established by several decades of work, specifically the use of uniform standards throughout the Great Lakes system, and (3) it takes a broader ecosystem approach to natural resource regulation by extending the water quality criteria to account for wildlife.

As described above, the United States and Canada have been sharing the responsibility for overseeing the use and management of the Great Lakes since 1909. More recently, the U.S. Great Lakes states have worked together to develop objectives to reduce the amount of toxic pollutants discharged into the lakes and establish uniform standards throughout the region, objectives espoused by the GLWQA. The proposed federal Guidance has formalized these efforts and strengthens and supports implementation and enforcement of these objectives.

The Guidance proposes water quality criteria for aquatic life, human life, and wildlife. The latter are unique in that federal criteria for wildlife have never been established before. By including wildlife, the EPA is attempting to develop criteria that take into account the broader effect of contaminants in the ecosystem.

The wildlife, as well as the aquatic and human life, criteria are two tiered. The development of

effluent criteria is frequently limited by the lack of available data on the specific effects of a pollutant on the environment. Laboratory and field test data often take years and significant funding to collect. The Guidance attempts to address these information gaps by establishing two tiers of criteria. The first is based on toxicity information from laboratory and field results. When complete toxicity data are not available, which is the case for many pollutants, the EPA has proposed a methodology (the second-tier criteria) to determine effluent regulations based on limited information.

All the criteria are based on the long-term consumption of food and water from the Great Lakes. The bioaccumulation of pollutants in the aquatic food chain are factored into the criteria to account for the disposition of organisms to accumulate some chemicals in their tissues to concentrations many times greater than the concentration of the chemical in the water. The bioaccumulation factor for humans was based on the assumption that only the muscle tissue of the aquatic organism would be consumed. The wildlife criteria assumed that the entire aquatic organism would be eaten.

Antidegradation policies were strengthened to encourage pollution prevention to ensure that water bodies currently meeting water quality criteria are not degraded by future contamination. In areas where water quality is currently better than the criteria require, degradation cannot occur unless the states determine it is necessary for important social and economic development. Areas identified as outstanding national resource water are protected from any degradation.

EFFECT ON MICHIGAN

Currently, the Guidance is being reviewed by various interest groups in the affected states to determine the environmental effect and economic cost of implementing and complying with the proposed regulations. Stakeholders include agricultural, industrial, municipal, and environmental interests. In coming months, each of these groups will be calculating and reporting on the various effects the proposed Guidance will have on its interests; the public comment period ends September 13, 1993. Following the comment period, support from the governors of the Great

Lakes states will be essential as states have two years from final promulgation of federal regulations to modify and adopt them.

The economic effect of the Guidance on Michigan is not clear. Because Michigan has already adopted fairly stringent emission controls, the effect of adoption of the proposed regulations should be less than in many neighboring states. The EPA has estimated the cost to 59 facilities in the Great Lakes region of implementing the Guidance; 25 facilities are in Michigan. The EPA estimates that it would cost the Michigan facilities \$12 million more than they are currently spending to comply with existing regulations to implement the Guidance. A Michigan Department of Natural Resources staff member has reviewed this estimate and has concluded that "the findings are inaccurate and misleading," claiming that costs were (1) included for studies and control technologies currently required by Michigan regulations and (2) based on incorrect assumptions.

The Michigan economy as a whole may actually gain as a result of the Guidance because it would equalize environmental regulations in the region; Michigan businesses have been subject to much stricter regulations than their counterparts in neighboring states, putting them at a competitive disadvantage. Additional benefits include the preservation of water quality for industries and cities that rely on water from the Great Lakes, as well as businesses that depend on fishing and tourism activities. One can expect to continue to hear of differing calculations made by the various groups

reviewing the regulations until a decision is made on whether to implement the Guidance.

CONCLUSION

Characteristics of the Great Lakes make them very susceptible to damage from nondegradable pollutants. The larger lakes have long retention times—the time it takes a chemical upon entering a lake to circulate through the system and leave (Lake Superior's retention time is 173 years, Lake Erie's retention time is 2.7 years), little biological activity (activity that will remove or stabilize chemicals in the system), significant depth, and fish and wildlife populations dependent on the Great Lakes system.

The Great Lakes Water Quality Guidance has addressed the propensity of the lakes to retain pollutants by proposing criteria to control the release and effects of water pollution on aquatic life, human life, and wildlife throughout the Great Lakes system. This unusual regional regulatory effort has grown out of the concern of people living in the region; the cooperation has crossed national boundaries and has included commitments on the state, provincial, and national levels to protect the integrity of the Great Lakes.

Throughout the review process, it is important to remember that the proposed Guidance provides us with the opportunity to illustrate to a worldwide audience the potential advantages of using a more comprehensive regulatory approach to manage and preserve the health of our "mers douces."

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