UNITED STATES RESPONSE TO RECOMMENDATIONS IN THE INTERNATIONAL JOINT COMMISSION'S TWELFTH BIENNIAL REPORT ON GREAT LAKES WATER QUALITY

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and
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INTRODUCTION

The United States (or U.S.) compliments the International Joint Commission (the Commission or "IJC") on the release of its ***Twelfth Biennial Report on Great Lakes Water Quality***. It contains thoughtful recommendations for actions by the U.S. and Canada (the Parties).

The Parties have made significant efforts to address adverse environmental impacts and to mitigate or reverse the subsequent effects. The Parties take pride in their cooperative efforts in working toward proactive solutions to avoid new impacts and to protect the Great Lakes Ecosystem from degradation. The U.S. wishes to assure the Commission of our firm commitment to continue these efforts.

Since the issuance of the IJC's last Biennial Report, many significant activities have taken place which have accelerated activities in the U.S. Great Lakes Program, the most significant of which is President Bush's Executive Order creating the Great Lakes Regional Collaboration. The Great Lakes Regional Collaboration will lead to the setting of strategic priorities for the Great Lakes Ecosystem and shows the Administration's continuing commitment to these national and international treasures. It harnesses the energy of all levels of government and the private sector and insures that the strategies are efficient and effective, and widely endorsed. Many of these strategies will directly address recommendations in the Twelfth Biennial Report. The Regional Collaboration builds upon the U.S. Policy Committee's Great Lakes Strategy, another important example of U.S. agencies collaborating to address, make, and track progress on the shared Great Lakes restoration priorities. It is important to note that the Great Lakes Regional Collaboration continues to benefit from the involvement of Canadian Federal and Provincial observers and the IJC.

Another significant activity which has recently begun is the review of the Great Lakes Water Quality Agreement (the Agreement) which is required upon the release of every third IJC Biennial Report. The U.S. remains committed to the Great Lakes Water Quality Agreement and the binational partnership with Canada that has developed since its signing. We believe that the Great Lakes Regional Collaboration will allow the U.S. to better implement the programs needed to achieve the binational goals of the Agreement. With our Canadian colleagues, the U.S. is committed to an open, transparent and inclusive review process that encourages the involvement of all interested Great Lakes stakeholders.

Other significant activities of note which have taken place during the last two years include:

- authorizing the Great Lakes Legacy Act for addressing contaminated sediments in the Great Lakes Areas of Concern and the initiation of the first three projects funded by this program: Black Lagoon in the Detroit River, Michigan AOC, Hog Island Inlet in the St. Louis River, Minnesota/Wisconsin AOC, and Ruddiman Creek in the Muskegon, Michigan AOC;

- a renewal of the Remedial Action Plan Program under the management of the U.S. Environmental Protection Agency's (EPA) Great Lakes National Program Office (GLNPO);
- in 2004, the issuance of the Lake Huron Binational Partnership Action Plan and the Lakewide Management Plans (LaMPs) for Lakes Superior, Michigan, Erie and Superior;
- holding the State of the Lakes Ecosystem Conference (SOLEC) and issuing the associated State of the Lakes Report;
- the recognition of the Presque Isle Bay, Pennsylvania AOC as being in Recovery Stage; and
- progress by the U.S. Fish and Wildlife Service's (USFWS) Natural Resources Damage Assessment program towards restoring and protecting Great Lakes AOCs, including: Fox River/Green Bay, Wisconsin; Grand Calumet River, Indiana; Kalamazoo River, Michigan; Saginaw River and Bay, Michigan; and Ashtabula River and Harbor, Ohio.

While we can be proud of the many successes during the last biennium, we recognize that there are a variety of continuing environmental issues in the Great Lakes ecosystem. These include toxic contaminants, the protection and restoration of important habitats; enhancing biodiversity; controlling the impacts of existing invasive species, while limiting future introductions; and promoting sustainable patterns of development. It is important to note that this response, while highlighting a small selection of representative activities, reflects a wide universe of programs being undertaken by the large number of U.S. Great Lakes partners to address these and other issues. These partners include Federal, State, Tribal and local government agencies as well as public, private and non-profit businesses and organizations.

On behalf of the entire U.S. Great Lakes community, the U.S. Department of State and EPA are pleased to present this Nation's response to the Commission's *Twelfth Biennial Report on Great Lakes Water Quality*.

CHAPTER 1: PHYSICAL INTEGRITY

This chapter concentrates on the impact of urban areas and climate change on Great Lakes water quality and makes specific recommendations to the Governments:

RECOMMENDATIONS

The Parties take binational actions to address the impact of urban land use on Great Lakes water quality by:

- ***evaluating under what circumstances best management practices are effective in managing urban runoff;***
- ***ensuring that information on urban best management practices reaches local authorities and implementers; and***
- ***assessing the cumulative effects of management actions to minimize the impacts of urbanization on the Great Lakes, using the Lake Erie basin as an example.***

RESPONSE

Both the U.S. and Canada recognize the importance of addressing the impact of urban land use on Great Lakes water quality. Early on, this recognition led to the 1972 binational landmark Pollution from Land Use Activities Reference Group (PLUARG) study that represented the first truly comprehensive effort to address the connection between land use and water quality. PLUARG's reports were among the first to acknowledge the need to move beyond point sources of pollution, and to consider nonpoint sources. The subsequent implementation of a variety of domestic programs have led to significant reductions in urban nonpoint source pollution in the U.S. since the study's conclusion.

More recently, the binational State of the Lakes Ecosystem Conference (SOLEC) Indicators Development Process has proposed a number of indicators that will help determine the impacts of urban land use of Great Lakes water quality. These include indicators on Urban Density, Land Cover-Land Conversion, Brownfield Redevelopment, and Ground Surface Hardening. The tracking of these indicators will help guide binational efforts to assess and improve upon any detrimental impacts on water quality.

Domestically, EPA identified urban runoff as one of the leading sources of water quality impairment in surface waters. Of the eleven pollution source categories listed in the report, urban runoff/storm sewers was ranked as the sixth leading source of impairment in rivers, fourth in lakes, and second in estuaries. State and local elected officials and agencies, landowners, developers, environmental and conservation groups, and others play a crucial role in protecting, maintaining, and restoring water resources. Their efforts, in aggregate, form the basis for addressing the nationwide challenge of urban runoff.

Currently, EPA is hoping to finalize in 2005 guidance entitled *National Management Measures to Control Nonpoint Source Pollution from Urban Areas.* This document will inform States, territories, authorized Tribes, and the public regarding management measures that may be used to reduce nonpoint source pollution from urban activities. Much of the information below is taken from this draft report.

Four major runoff management themes dominate the management practices presented in this guidance document:

1. Minimizing the amount of impervious land coverage and disconnect impervious areas.
2. Promoting infiltration.
3. Preventing polluted runoff by not allowing pollutants and runoff to mix.
4. Removing pollutants from runoff before allowing it to flow into natural receiving waterbodies.

The proposed management practices can be grouped into two basic categories:

- Nonstructural practices which prevent or reduce urban runoff problems in receiving waters by reducing potential pollutants or managing runoff at the source. These practices can take the form of regulatory controls (e.g., codes, ordinances, regulations, standards, or rules) or voluntary pollution prevention practices. Nonstructural controls can be further subdivided into land use practices and source control practices.

- Structural practices which are engineered to manage or alter the flow, velocity, duration, and other characteristics of runoff by physical means. In doing so they can control storm water volume, and peak discharge rates and, in some cases, improve water quality. They can also have ancillary benefits such as reducing downstream erosion, providing flood control, and promoting ground water recharge.

Watershed Approach

Since 1991, EPA has promoted the watershed approach as the key framework for dealing with problems caused by urban runoff and other sources that impair surface waters. Five principles guide the watershed approach:

- **Place-based focus:** Activities are directed within specific geographic areas known as management units. When surface runoff is the primary issue, these management units are defined by watershed boundaries. Other types of boundaries can also be used to define management units in special circumstances. If ground water is an issue, for example, ground water recharge areas might be a logical designation.

- **Stakeholder involvement and partnerships:** The people most affected by management decisions are involved throughout the process. Stakeholder participation helps to ensure that local quality of life, economic stability, and other

important community issues are incorporated into planning and implementation activities. Partnerships among public agencies and private groups at all levels are also crucial for long-term success.

- **Environmental goals and objectives:** The success of watershed initiatives is measured by improvements of the water resource rather than by programmatic objectives. For example, reestablishing the pool and riffle structure in a stream channel to increase aquatic insect and fish populations might be an objective. Local goals and objectives need to be consistent with all applicable State, Tribal, and Federal statutes and regulations, including water quality standards.

- **Problem identification and prioritization:** Sound scientific data and methods are used to identify and prioritize threats to human and ecosystem health. This process usually begins with the assessment and characterization of current natural resource and community conditions within the management unit(s). Problems, including their causes and sources, are also documented. Stakeholders and partners then work jointly to set priorities among the various water resource concerns, taking into account priorities already established at scales above and below the management unit.

- **Integration of actions:** Stakeholders and partners take actions in a comprehensive and integrated manner. Results are then evaluated and actions are adjusted as needed.

A key attribute of the watershed approach is that it can be applied with equal success to large and small scale watersheds. Although specific objectives, priorities, actions, timing, and resources might vary from large scale to small scale, the basic goals of the watershed approach remain the same - protecting, maintaining, and restoring water resources.

Management Practices

The U.S. Government has instituted a number of tools for addressing urban nonpoint source pollution and for addressing the four major runoff management themes listed above.

During the first 15 years of EPA's national program to abate and control water pollution (1972–1987), EPA and State partners focused most of the water pollution control activities on traditional point sources. These point sources have been regulated by EPA and the States through the National Pollutant Discharge Elimination System (NPDES) permit program established by Section 402 of the Clean Water Act (CWA). The NPDES program functions as the primary regulatory tool for assuring that water quality standards are met. NPDES permits, issued by either EPA or an authorized State, are developed to include both water quality-based and technology-based effluent limitations.

In 1987, in view of the progress achieved in controlling point sources and the growing national awareness of the increasingly dominant influence of NPS pollution on water quality, Congress amended the CWA to focus greater national efforts on nonpoint

sources. Under this amended version, referred to as the 1987 Water Quality Act, Congress revised Section 101, Declaration of Goals and Policy," to add the following fundamental principle:

> *It is the national policy that programs for the control of nonpoint sources of pollution be developed and implemented in an expeditious manner so as to enable the goals of this Act to be met through the control of both point and nonpoint sources of pollution.*

The Water Quality Act of 1987 also included language that required comprehensive storm water permitting using a two-phased approach. Phase I of the storm water program requires permits for medium and large municipal separate storm sewer systems in incorporated areas serving over 100,000 population, runoff from industrial activity, and construction activity that disturbs 5 or more acres of land. Phase II requires, as of March 2003, NPDES permits for small municipal separate storm sewer systems and construction activity that disturbs 1-5 acres.

The CWA also establishes several reporting, funding, and other control programs that address pollutants carried in runoff that is not subject to confinement or treatment. These programs that relate to watershed management and urban nonpoint source control include:

- CWA Section 303(d) for Impaired Waters,
- CWA Section 305(b) and the National Water Quality Inventory
- CWA Section 319 Grant Program for Nonpoint Source Management
- Clean Water State Revolving Fund

It is critical to the success of managing urban nonpoint source pollution control programs that best management practices are identified and shared. Once programs have been established and management practices implemented, managers can evaluate the effectiveness of their programs using program and administrative indicators. This evaluation involves reassessing conditions in the watershed to determine whether the implemented practices effectively reduced nonpoint source pollution. This reevaluation also identifies areas where additional restoration or preservation activities are needed, which will guide future watershed initiatives and thereby restart the management cycle. While this may be difficult to do on a lakewide basis such as the IJC is recommending for Lake Erie, such sharing does take place through a number of venues which are illustrated by the following examples.

In 2004, Ohio's Lake Erie Commission began a voluntary, incentive-based program for balanced growth in the Ohio Lake Erie basin. This plan calls for the creation of a locally driven planning framework that includes:

- A new focus on land use and development planning in the major river tributary watersheds of Lake Erie. The goal is to begin to link land use planning to the health of watersheds and the lake.

- The creation of Watershed Planning Partnerships composed of local governments, planning agencies, nonprofit organizations, and other parties in each watershed. Participation in these partnerships would be voluntary but encouraged by State incentives.

- The locally determined designation of Priority Conservation Areas and Priority Development Areas in each watershed.

- The development of suggested model regulations to help promote best local land use practices that minimize impacts on water quality.

- The alignment of State policies, incentives, and other resources to support watershed planning and implementation for balanced growth.

Another Great Lakes example of ensuring that information on urban best management practices reached local authorities and implementers is the Lake Michigan Watershed Academy launched by the Lake Michigan LaMP in 2003. The academy began with a two and a half day training session aimed at eight regional planning agencies but open to other stakeholders. In 2004, the participating planning agencies each held a one day training session often with partners and co-sponsors. The conferences covered topics of impacts on Lake Michigan, unique local situations and needed actions. Approximately 1,000 local officials and residents attended. Follow up is still underway and includes hands on workshops for local officials, fact sheets for each Lake Michigan Watershed, and the formation of a network of Great Lakes regional planning agencies.

Another program that provides a valuable planning tool for managing nonpoint sources of pollution is the Total Maximum Daily Load (TMDL) Program for Impaired Waters. A TMDL is the sum of allocated loads of pollutants set at a level necessary to implement applicable water quality standards for an impaired water body, including wasteload allocations for point sources, and load allocations for nonpoint sources and natural background conditions.

A 1998 survey of waters requiring a TMDL found that 47 percent are impaired due to a combination of point and nonpoint sources, 43 percent are impaired due to nonpoint sources only, and just 10 percent are impaired by point sources only. This points to the utility of the TMDL program and its potential impact on reducing urban runoff to the Great Lakes.

To date, few TMDLs have been established for waters of the Great Lakes. A few shoreline *E. coli* TMDLs (Indiana - Lake Michigan) have been established. In addition, some TMDLs have also been established for tributaries to the Great Lakes - (Lake Macatawa, Michigan; all of the Cuyahoga River in Ohio; Salt Creek/Little Calumet River, Indiana; the St. Joseph River, Indiana/Michigan; and the Galien River, Michigan).

Beyond Traditional Water Quality Programs

Recently, there has been an increased focus on coordinating the multitude of Federal programs with a role in watershed protection and land use. The aforementioned Great Lakes Regional Collaboration and the recent Memorandum of Agreement between EPA and the National Oceanic and Atmospheric Administration (NOAA) to develop a coastal communities partnership are excellent examples of this increased coordination. In addition, there is significant value in the increased coordination between water quality and land conservation programs administered by the U.S. Department of Agriculture such as the Conservation Reserve Enhancement Program, the Wetlands Reserve Program, and the Environmental Quality Incentive Program. These programs are making a significant difference in the water quality of the Great Lakes by addressing both nutrient and sediment loadings.

Another example of Federal-State cooperation to protect coastal waters is the Coastal Nonpoint Pollution Control Program co-administered by NOAA and EPA pursuant to the 1990 reauthorized amendments to the Coastal Zone Management Act (CZARA). CZARA requires participating States to design programs to implement 56 different management measures across (nearly) all the main categories of NPS pollution. Urban development, including impacts from new and existing development, roads/highways/bridges, and septic systems are covered in these management measures. All of the Great Lakes States participate in CZARA except for Illinois which is currently developing a delegation and pursuing Coastal Zone status. Indiana and Ohio are the two newest States to join, so they are just beginning to develop their coastal nonpoint programs. Wisconsin and Pennsylvania have fully approved programs, and New York is nearly approved.

The U.S. Army Corps of Engineers (Corps) is working in collaboration with other Federal agencies, State and local land management agencies, and the Great Lakes Commission to develop computer models to predict soil erosion and sediment transport for tributaries to the Great Lakes through the Great Lakes Tributary Model program authorized by Section 516(e) of the Water Resources Development Act (WRDA) of 1996, as amended. Modeling tools developed under this program are being used by local governments to evaluate the impact of land use decisions and to more effectively plan and implement measures for soil conservation and nonpoint source pollution prevention. Models have been built or are under development for twenty tributaries, including the Clinton River, where the model is being used by the counties and the State of Michigan to manage urban stormwater and bank erosion problems and reduce the loadings of sediments to Lake St. Clair. A model was also completed in 2004 for Mill and Cascade Creeks which drain areas of Erie County, Pennsylvania to Lake Erie. This model is being used by the State of Pennsylvania and the local RAP group to design a stream restoration project and support delisting of the Presque Isle Bay AOC.

The Corps is also supporting State, local, Tribal and non-profit organizations in the planning, design, and construction of projects to protect and restore aquatic habitat at more than fifty locations in the Great Lakes Basin through several authorities, including the Great Lakes Fishery and Ecosystem Restoration Program, authorized by Section

506 of WRDA 2000. Many of these projects will preserve and enhance the ability of wetlands to trap sediments and nonpoint pollutants. An example project under study is at Red Mill Pond, in LaPorte County, Indiana. The Pond was initially formed in 1833 when a dam was constructed on the Little Calumet River for hydropower to operate a sawmill. A significant native wetland community has developed and is dependent on the earthen dam. The dam has been declared a hazard and has to be removed. Dam removal threatens to destroy the wetland, and diminish its capacity to filter nonpoint pollution. The proposed project would include restoration of the stream morphology at the dam site, and the restoration and preservation of open marsh, fen, seep and woodland.

Through its grant support to the biodiversity partnership called Chicago Wilderness, the USFWS has helped develop a variety of projects intended to get sustainable development tools into the hands of local decision-makers and developers. These include best practices for urban runoff management as well as habitat protection, restoration, and management. Chicago Wilderness developed a set of recommendations for real estate developers, city planners, and community decision-makers to promote sustainable development in the region and also published the Conservation Design Resource Manual, a guidebook containing model ordinances to promote local nature, which communities can adopt or adapt for their own use.

In August 2004, EPA released a coordinated Smart Growth Strategy to insure that the Agency's actions help State and localities revitalize more brownfields and reduce the impact of development on air and water quality. It focuses on five target areas:

1. Promote infill and redevelopment;

2. Catalyze smart growth transportation solutions;

3. Partner for innovative development and building regulations;

4. Support smart growth initiatives; and

5. Ensure EPA policies recognize the environmental benefits of smart growth.

A document entitled *Protecting Water Resources with Smart Growth* was developed by EPA to offer specific ideas on how techniques for smarter growth can be used to protect water resources, with a focus on urban land use and urban runoff. It can be accessed at: www.epa.gov/smartgrowth

In addition, GLNPO's Habitat Restoration and Protection Program has funded more than ten projects in urban areas. This program tries to balance urban protection and restoration projects with the protection and restoration needs of wilder, less inhabited portions of the basin, understanding that urban results will be measured not so much in terms of acres as in how many people have access, and not so much in terms of quality of restoration as in preservation of what is left. New tools for dealing with urban ecological problems were developed. Ecological restoration and protection activities were initiated in Northwest Indiana, Northeast Ohio, and Buffalo, New York.

EPA Region 5 will continue its collaboration with the Midwest Spatial Decision Support System Partnership (http://www.epa.gov/waterspace/) to develop, improve, disseminate and demonstrate spatial decision support system tools. Its experience has shown that local planners and decision makers need web-based access to scalable, data-based watershed modeling tools in order to make land use decisions that are protective of water quality. When provided with those tools and a support network such as the Partnership, municipal officials are much more willing and able to factor water quality impacts into their land use decisions. EPA Region 5's overall goal is to enhance environmental protection and watershed management by elevating the quality of local land use discussions and decisions through the use of decision support tools.

Finally, in order to facilitate sharing information on current research findings and successful best management practices across a broad range of stakeholders, including in particular local authorities and implementers, EPA is specifically addressing the impacts of urban land use on storm water runoff (and a range of other environmental impacts) through a conference, a charrette (an intensive design effort), and a quantification effort. This effort has the potential to be translated and transferred to urban areas throughout the Great Lakes. The conference, to be held in Milwaukee, Wisconsin, is titled “Green Makeover - Retrofitting Sites in Urban Areas to Enrich City Environments,” and will emphasize environmental and quality of life considerations as a part of urban site redevelopment. By including green retrofit techniques such as rain gardens and native landscaping, the environmental benefits of redevelopment can be compounded to provide for long lasting improvement to air and water quality. Green retrofit techniques emphasizing the feasibility and benefits of management practices on the site is especially important in the Great Lakes Basin, where combined storm sewer overflows are having many negative environmental impacts.

At the conference, groups will plan retrofits of actual case study sites in Milwaukee. These designs will potentially be implemented in conjunction with a quantification project to measure the benefits of green retrofit, with a strong stormwater (both quality and quantity) component. The environmental benefits of these green redevelopment techniques are often poorly quantified, and this project intends to fill some of these gaps in knowledge. Quantification of the environmental benefits and financial costs of green retrofit techniques are needed in order to justify and promote their widespread use.

CHAPTER 2: BIOLOGICAL INTEGRITY

This chapter addresses the impacts of Alien Invasive Species and Pathogens in the Great Lakes and makes three sets of recommendations, labeled A, B, and C below:

The governments take the following measures to eliminate the threat and impacts of aquatic alien invasive species in the Great Lakes:

RECOMMENDATION A

Take immediate action to:

- ***in the United States, pass the National Aquatic Invasive Species Act (NAISA) reauthorizing the National Invasive Species Act (NISA) of 1996;***
- ***in Canada, implement the National Action Plan to address the threat of aquatic alien invasive species; and***
- ***ratify and implement the International Maritime Organizations Convention for the Control and Management of Ships ballast Water and Sediments, and pursue stringent measures and rapid timelines.***
- ***Issue a reference to the International Joint Commission to:***
- ***help identify the most effective ways to coordinate binational prevention efforts and harmonize national plans, particularly those dealing with residual ballast water and sediment in ballast tanks;***
- ***evaluate the effectiveness of current institutional arrangements;***
- ***assist with the establishment of a regional standard stronger than the minimum required by the International Maritime Organization Convention;***
- ***ensure that economic analyses carried out for projects with potential environmental effects include the environmental and societal costs of invasive species control, damage, and mitigation, and the costs and benefits of prevention measures; and***
- ***assist with public education and communications.***

RESPONSE

The IJC's determination that alien invasive species are a critical threat to the health and viability of the Great Lakes has helped focus government and public attention on this danger. The IJC's call to action on the Asian Carp Barrier has helped spur the U.S. Government and the Great Lakes States to action. The joint IJC/Great Lakes Fishery Commission letter urging binational action to prevent invasive species raised the profile of this important issue. It is difficult to overstate the importance of the pending and ever increasing threats of aquatic nuisance species to the Great Lakes. Taking an ecosystem approach for the prevention and management of this issue should be considered.

The U.S. agrees that effective legislative and international measures are important to addressing invasive species issues. There were a number of bills introduced in the last Congress that would amend and reauthorize National Invasive Species Act (NISA), including the National Aquatic Invasive Species Act (NAISA). The U.S. agencies will work to coordinate the U.S. Government's position on such bills if they are reintroduced in Congress, keeping in mind the Aquatic Nuisance Species Task Force Strategic Plan, progress thus far on ballast water regulations, the International Maritime Organization's (IMO) ballast water convention, and the National Invasive Species Management Plan. The U.S. has not come to a decision on signature or ratification of the IMO's Convention for the Control and Management of Ships' Ballast Water and Sediments. The U.S. is working through the Ballast Water Working Group to develop and comment on the various guidelines called for by that Convention. These guidelines will, in essence, constitute the guidance the Parties will use in implementation of the Convention. As those guidelines are developed, the U.S. Government will be in a better position to formulate its views on signature or ratification of the Convention.

One response to the variety of threats posed by invasive species was the May 2003 Aquatic Invasive Species Summit convened by the USFWS and the City of Chicago's Department of Environment. More than seventy global experts participated. Solutions to halting the influx of aquatic invasive species were explored, and recommendations developed. The principal recommendations were two-fold, and included the long term goal of hydrologically separating the Mississippi River drainage system and the Great Lakes Basin within ten years. The second principal recommendation included the short term goal of pursuing additional control and prevention technologies to augment the existing and proposed electrical barriers. The Summit proceedings have been published, and an excellent brief summary can be found at:

http://midwest.fws.gov/Chicago/summit.pdf

RECOMMENDATION B

Issue a reference on aquatic alien invasive species to the International Joint Commission to:

- ***Help identify the most effective ways to coordinate bi-national prevention efforts and harmonize national plans, particularly those dealing with residual ballast water and sediment in ballast tanks;***
- ***Evaluate the effectiveness of current institutional arrangements;***
- ***Assist with the establishment of a regional standard stronger than the minimum required by the International Maritime Organization Convention;***

- ***Ensure that economic analyses carried out for projects with potential environmental effects include the environmental and societal costs of aquatic alien invasive species control, damage, and mitigation, and the costs and benefits of prevention measures; and***

- ***Assist with public education and communications.***

RESPONSE

The U.S. supports further discussions with Canada and the IJC to seek agreement on the scope of a reference.

The U.S. is consulting with Canada on a possible reference to the IJC. However, the governments are anxious to avoid overlapping or duplicative efforts. It appears that certain parts of the suggested IJC reference are in the process of being carried out by U.S. agencies and their Canadian counterparts. For example, the U.S. and Canada have intensified cooperation on harmonizing prevention efforts for alien invasive species. The two Parties met in November 2004 after Canada released its internal National Management Plan and met again in spring 2005. The U.S. does not rule out the possibility of working towards more stringent ballast standards than would be adopted under the IMO. It would be best to fashion a reference that would focus the IJC's efforts where they would add they most value.

The U.S. and Canada are also discussing the geographic scope such a reference would cover. Such a reference might do more to strengthen the two Parties' national strategies for alien invasive species if it was not limited to the Great Lakes. Consistent with this approach, the U.S. presently does not believe that there should be a separate ballast water discharge treatment standard for the Great Lakes. The U.S. continues to support the mandatory ballast water exchange requirements applicable under U.S. law to the Great Lakes. The U.S. Coast Guard is currently undertaking an environmental impact analysis of several alternative standards in preparation for proposing a rule for use in approval of ballast water treatment systems under the National Invasive Species Act that will establish a biologically meaningful and scientifically sound ballast water discharge standard on a national basis. Ballast water exchange would still be allowed, but having a ballast water discharge standard would facilitate improvement of treatment systems.

EPA, NOAA, and the USFWS are Cooperating Agencies in the preparation of the Draft Programmatic Environmental Impact Statement. This standard would not only help provide the Great Lakes with protection against the invasion of aquatic invasive species, it would also avoid the problems a Great Lakes specific standard would bring, such as economic impacts that might be caused if vessels were to shift their trade patterns to ports outside the Great Lakes to avoid the cost of complying with a more restrictive regional standard.

These recommendations are also being considered by the Great Lakes Regional Collaboration's Aquatic Invasive Species Strategy Team and the Indicators and Information Strategy Team's Communications Work Group.

RECOMMENDATION C

All levels of governments should create and implement coordinated planning actions to fully protect drinking water from increased pressures from industry, urban expansion, aging infrastructure and agriculture, including ecosystem and human health protection from large-scale animal operations.

RESPONSE

The U.S. agrees with this recommendation and has a variety of longstanding programs in place and new ones being developed which strive to fully protect drinking water from a variety of pressures.

For almost thirty years, protecting the Nation's public health through safe drinking water has been the shared responsibility of EPA, the States, and over 53,000 public water systems (PWSs) nationwide that supply drinking water to more than 270 million Americans (approximately 90 percent of the U.S. population). Within this time span, drinking water standards have been established and are being implemented for ninety-one microbial, chemical, and radiological contaminants. Forty-nine States have adopted primary responsibility for enforcing their drinking water programs. Additionally, PWS operators are better informed and trained on the variety of ways to both treat contaminants and prevent them from entering the source of their drinking water supplies.

During 2005-2008, EPA, the States, and PWSs will build on these programmatic successes while working toward the goal of assuring that 95 percent of the population served by PWSs receives drinking water that meets all applicable health-based standards through effective treatment and source water protection. This goal reflects the fundamental public health protection mission of the national drinking water program. The standards typically do not prescribe a specific treatment approach; rather, individual systems decide how best to comply with any given standard based upon their own unique circumstances. Systems achieve compliance with standards by employing various elements of what public health experts refer to as "multiple barriers of protection" which may include source water protection, various stages of treatment, proper operation and maintenance of the distribution and finished water storage system, and customer awareness.

EPA has identified key activities within five core program areas that are critical to ensuring safe drinking water. The core program areas are:

- the development or revisions to drinking water standards;
- the implementation of drinking water standards and other program requirements;
- the promotion of sustainable management of drinking water infrastructure;
- the protection of sources of drinking water from contamination; and
- the assurance that critical water infrastructure is secure from terrorist and other intentional acts.

The Drinking Water State Revolving Fund is a major EPA/State effort that has provided States with significant financial resources to address program needs resulting from aging infrastructure and regulatory requirements. Protection of sources of drinking water should be enhanced by the States' recent completion of assessments for all public water systems that identify potential sources of contamination and the source water's susceptibility to contamination. Efforts at the State and local level are now shifting towards using the information in the assessments to identify appropriate measures to protect drinking water.

Collectively, these core areas and other interrelated elements of the national safe drinking water program form a balanced, integrated framework that comprises the multiple barrier approach to protecting public health from unsafe drinking water. At the national level, implementation of this approach is expected to result in significant progress toward the public health goals described above.

With respect to the last part of the recommendation regarding the protection of ecosystem and human health from large scale animal operations, on February 12, 2003, EPA issued revised regulations for the Effluent Limitations Guidelines and the National Pollutant Discharge Elimination System Permit Regulations for Concentrated Animal Feeding Operations (CAFOs - 68 FR 7176). The changes were intended to remove ambiguity about which operations are covered by EPA rules and parallel rules adopted by authorized States and to ensure effective manure management by large operations, including land application. The revised regulations expanded the number of operations covered from 12,500 to an estimated 18,500 and included requirements to address the land application of manure from CAFOs. EPA estimates that every year this rule is implemented nationwide, it will remove 166 million pounds of nutrients and 2.2 billion pounds of sediment loads from existing discharges.

EPA is currently working to resolve issues arising from the February 28, 2005 U.S. Court of Appeals, Second Circuit opinion in Waterkeeper Alliance Inc., et al. v. EPA, in which the court overturned or remanded certain provisions of the regulation.

CHAPTER 3: CHEMICAL INTEGRITY

This chapter addresses the health impacts of mercury and PCBs, especially in AOCs, the Parties ability to communicate these health risks, and methods for controlling the global emission and deposition of mercury. The IJC makes three recommendations labeled A, B, and C below:

RECOMMENDATION A

The Commission recommends that the two federal governments, in conjunction with the states and provinces and institutions:

> ***Undertake retrospective and prospective epidemiological studies, in Areas of Concern and other pertinent locations of the Great Lakes basin, to better understand potential neuro-developmental effects associated with methyl mercury and PCBs.***

RESPONSE

The U.S. agrees that a better understanding of the potential neuro-developmental effects associated with methylmercury and PCBs would benefit not only the people living in or adjacent to the AOCs but also all of the residents of the Great Lakes Basin. We would also like to note that there are substances besides PCBs and mercury that have deleterious effects at sufficient levels of exposure. Many of these are being addressed by the Great Lakes Binational Toxics Strategy.

The Centers for Disease Control and Prevention (CDC), the Agency for Toxic Substances and Disease Registry (ATSDR) and the States are generally the agencies responsible for conducting epidemiological investigations (both retrospective and prospective).

ATSDR is currently working with the IJC to produce a report evaluating the health implications of hazardous substances in the U.S. 26 AOCs. This report is currently in draft form. Upon conclusion of this report, ATSDR has no future plans to undertake retrospective and prospective epidemiological studies in AOCs in the Great Lakes Basin.

Epidemiological studies of the exposure and effect of methylmercury are best conducted for populations that have relatively high exposures. In general, there are not grounds for thinking methyl mercury exposures are especially high in Great Lakes AOCs. For example, mercury has been a factor in designating only one U.S. AOC (Deer Lake, Michigan). However, as additional blood methylmercury level data are collected and analyzed for various populations in the region, additional epidemiological studies may be warranted.

In recent years, the U.S. has contributed to epidemiological studies of methylmercury exposures among fish-eating populations. These studies have been used in the development of the EPA reference dose for methylmercury exposure, in the National Academies of Science's review of the reference dose in Toxicological Effects of Methylmercury (2000), and in ATSDR's toxicological profiles.

Additional studies are being conducted among populations that have high methylmercury exposure because of elevated concentrations of methylmercury in fish and/or dietary patterns (studies by Dr. Donna Mergler and Dr. Ellen Silbergeld). Lessons from such major studies will have broad geographic applicability. Therefore, ATSDR will be focusing its Great Lakes related efforts on its Great Lakes Human Health Effects Research Program (GLHHERP).

Great Lakes Human Health Effects Research Program

Since 1992, ATSDR has run the GLHHERP which is designed to characterize exposure to contaminants via consumption of Great Lakes fish, and investigate the potential for short and long term adverse health effects. GLHHERP's goals are to identify sensitive human sub-populations residing in the Great Lakes Basin, and to reduce exposure to toxic chemicals. It is designed to investigate and characterize the association between the consumption of contaminated Great Lakes fish and short and long term harmful health effects. Its six objectives are:

- Build upon and extend the results from past and ongoing research;
- Develop information databases and/or research methodology that will provide long term benefits to the human health effects research efforts in the Great Lakes Basin;
- Provide direction for future health effects research;
- Provide health information to State/local health officials, the concerned public, and their medical health care professionals;
- In concert with State/local health officials, increase public awareness regarding the potential health implications of toxic pollution in the Great Lakes Basin; and
- Coordinate as necessary with relevant U.S. Department of Health and Human Services research programs and activities, including those of CDC, the Food and Drug Administration (FDA), the National Institutes of Health (NIH), and the Indian Health Service (IHS), as well as with EPA and State and local health departments to ameliorate adverse public health impacts of persistent toxic substances in the Great Lakes Basin.

Several studies evaluating the health effects of eating fish from various locations within Great Lakes Basin have been completed or are ongoing. Here is a brief summary of these studies with more information provided in Appendix 1. The first five studies are

ongoing; the second five are completed and are in the process of submitting publications:

- An epidemiologic study in an established cohort of American Indians, the Mohawk Indian Tribe, which investigates the association between the consumption of locally caught fish and wildlife and body burdens of PCBs , 68 PCB congeners, dichlorodiphenyldichloroethylene (DDE), mirex, and hexachlorobenzene (HCB) in men and women who live along the St. Lawrence River and its tributaries.

- A longitudinal assessment of neuropsychological and thyroid function in aging Great Lakes fisheaters and a prospective study of health outcomes in Asian Americans.

- A longitudinal-sequential study involving behavioral testing of three cohorts of children born to women from Oswego County, New York, who consumed large amounts of Lake Ontario sportfish over their lifetime.

- A cross-sectional and longitudinal observational assessment of the effects of PCB exposure, both current and *in utero*, on reproductive health. The main goal of this project is to assess fecundity and reproductive success in two cohort studies of individuals selected from two source populations at elevated risk of exposure to PCBs via consumption of Great Lakes sport-caught fish.

- A research grant to conduct statistical analyses of congener-specific serum PCB data for about 750 adult Mohawk Indians using multivariate techniques and to compare the results with those for other published relevant databases to identify unique populations and environmental variables in the Mohawk cohort.

- The New York State Angler Cohort Study (NYSACS) is a population-based study established to assess the association between past and current consumption of sport fish, from the Great Lakes, and short and long term human health effects such as reproductive and developmental effects.

- A research grant to continue and expand mercury exposure research which will provide additional information needed regarding methylmercury exposure and possible health risks to pregnant women and women of childbearing age living in the Great Lakes Basin.

- A continuing examination of the association between sport caught fish consumption in the diet of Great Lakes area residents and serum levels of PCBs, DDE, dioxins, and furans which have been detected in Great Lakes fish.

- A longitudinal assessment of exposure and the potential for adverse health effects such as reproductive and developmental effects to chlorinated hydrocarbons by consumption of contaminated Great Lakes Fish in pregnant woman of African-American descent and their newborns.

- A study of the Ojibwa Tribe to determine exposure to methylmercury and organochlorines (PCBs and pesticides) via fish consumption and their correlation with adverse health outcomes.

In the future, the GLHHERP plans to continue to provide research findings to public health officials to improve their ability to assess and evaluate chemical exposure in vulnerable populations. ATSDR also plans to focus on research priorities of children's health, endocrine disruptors, mixtures, surveillance, and identification of biomarkers, i.e., exposure, effect, and susceptibility. In addition, the program will use established cohorts to monitor changes in body burdens of persistent toxic substances and specified health outcomes**,** and develop and evaluate new health promotion strategies and risk communication tools.

It is also important to note that there are national efforts which will have a profound impact on assessing human health both nationwide and within the Great Lakes Basin. These include work being done by the CDC and EPA.

Centers for Disease Control and Prevention Efforts

CDC's National Health and Nutrition Examination Survey (NHANES) is a continuous survey of the health and nutritional status of the civilian, non-institutionalized U.S. population. It is designed to be representative of the general U.S. population. Data are released and reported in two year cycles. NHANES began measuring blood mercury levels in a representative sample of these populations in 1999 to determine levels of total blood mercury in childbearing-aged women and in children aged 1-5 years. The findings confirmed that blood mercury levels in young children and women of childbearing age usually are below levels of concern. However, 6 percent of childbearing-aged women had mercury exposure levels at or above a blood mercury concentration equivalent to the EPA Reference Dose (RfD). EPA defines the RfD as an estimate of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. An estimated level assumed to be without appreciable harm. For more information, please go to:

www.cdc.gov/mmwr/preview/mmwrhtml/mm5343a5.htm

It is also important to note that the RfD does not define a bright line above which individuals are at risk of adverse effect. The work being undertaken by the GLHHERP as described above is helping to determine whether U.S. populations in the Great Lakes Basin are experiencing mercury exposure higher than national norms. The same applies to other contaminants of concern, both in NHANES and in the Great Lakes Basin.

CDC's Environmental Public Health Tracking Program is tracking the ongoing collection, integration, analysis, and interpretation of data about environmental contaminants, exposure to environmental contaminants, and human health effects potentially related to exposure to environmental contaminants. The Program also disseminates information related to these data. The mission of environmental public health tracking is

to improve the health of communities. Federal, State, and local agencies, using information from an environmental public health tracking network, will be better prepared to develop and evaluate effective public health actions that will prevent or control chronic and acute diseases, which can be linked to hazards in the environment. This information can help healthcare professionals provide better care and targeted preventive services. In addition, the public will have a better understanding of what is occurring in their communities and what actions they may take to protect or improve their health. Currently, four of the Great Lakes States participate in this program (Wisconsin, Illinois, New York, and Pennsylvania).

A competitive grants program also was offered to schools of public health to establish Centers of Excellence in Environmental Public Health Tracking. These Centers provide expertise and support to CDC and State and local health departments in developing and using data from environmental public health tracking systems at the local, State, and national levels and investigate potential links between health effects and the environment. For more information, please go to:

http://www.cdc.gov/nceh/tracking/default.htm

EPA Efforts

As part of its mission to protect human life and the environment, EPA conducts research to characterize, predict and diagnose human and ecosystem exposure to harmful pollutants and other conditions in the air, water, soil, dust and food. The National Exposure Research Laboratory and other agency bodies provide exposure information for chemicals, biologicals, radiation, and changes in climate, land and water use. EPA's Integrated Risk Information System (IRIS), summarizes available toxicity data and contains EPA's assessment of the ways in which the general public may be exposed to individual chemicals. Additionally, EPA develops and field tests new technologies for assessing and modeling exposure patterns, concentrations and scenarios, including short and long-term effects and the potential for exposure across great distances. Much of this work has led to EPA input into the NHANES selection of contaminants to be selected and work by EPA scientists based on the NHANES data collected.

EPA has also been working for several years on the development of measures to track factors important for children's environmental health. In proportion to their size, children breathe more air, drink more water and eat more food than adults. This puts them at greater risk of exposure to pollutants. Children's bodies are also less able to metabolize, detoxify and expunge these pollutants. In recognition of the greater vulnerability of children to harmful substances, EPA has established the Office of Children's Health Protection (OCHP). OCHP ensures that all standards set by EPA are protective of any heightened risks faced by children and that newly developed policies address children's health concerns. Through education and outreach, EPA also seeks to raise awareness of children's health concerns among schools, communities, health professionals and families. Part of this work has resulted in two EPA publications, *America's Children and the Environment, Measures of Contaminants, Body Burdens,*

and Illnesses; and *America's Children and the Environment: A First View of Available Measure*. Both are available at:

www.epa.gov/envirohealth/children

EPA is embarking on a new phase of this work in which it will be discussing new areas of work in children's environmental health indicators. EPA conducted a workshop in March 2005 which focused on suggested new data sources and methods to improve the measures for different topic areas currently in the reports and on additional new topic areas or measures that should be considered. Some of the specific issues EPA will be considering are neuro-developmental disorders in children, better ways to assess dietary exposure to food contaminants, and additional measurements of chemical body burdens in children. Information from this work can be factored into fish consumption advisories for sensitive populations issued by the Great Lake States.

RECOMMENDATION B

The Commission recommends that the two federal governments, in conjunction with the states and provinces and institutions:

> ***Make fish advisories clear, simple, and consistent, and ensure that they are reaching the intended audiences.***

RESPONSE

The U.S. agrees that fish advisories should be clear and simple to reach the intended audiences. Since contaminant levels may vary somewhat location-to-location, complete consistency may not be possible. The U.S. agrees that appropriate consistent advice across the Great Lakes s is desirable.

State and Tribal Efforts

The States and American Indian Tribes have primary responsibility for advising residents about the health risks of consuming chemically contaminated noncommercially caught fish and wildlife. They do this by issuing consumption advisories for the general population, including recreational and subsistence fishers, as well as for sensitive sub-populations (such as pregnant women, nursing mothers, and children). These advisories are based on chemical contaminants (e.g., mercury, PCBs, and dioxins) that have been found in local fish and wildlife. The advisories include recommendations to limit or avoid consumption of certain fish and wildlife species from specified water bodies or, in some cases, from specific water body types, such as all inland lakes.

States typically issue four major types of advisories and bans to protect both the general population and specific sub-populations:

- When levels of chemical contamination pose a health risk to the general public, States may issue a “no consumption” advisory for the general population.

- When contaminant levels pose a health risk to sensitive sub-populations, States may issue a “no consumption” advisory for the sensitive sub-population.

- In water bodies where chemical contamination is less severe, States may issue an advisory recommending that either the general population or a sensitive sub-population restrict their consumption of the specific species for which the advisory is issued. This may include size-based restrictions, an important tool for protecting public health, since older and larger fish often contain higher levels of toxic substances

- When events warrant, States may issue a commercial fishing ban, which prohibits the commercial harvest and sale of fish, shellfish, and/or wildlife species from a designated water body and, by inference, the consumption of all species identified in the fishing ban from that water body.

All of the Great Lakes States have fish consumption advisories. When States and Tribes issue advisories, they may take into account the culture and languages of their respective residents. In order to make the advisory well understood, fish consumption advisories are often published in multiple languages. The advisories may also not only contain information on the possible pollutant problems, they also may inform fish-eaters of the best ways in which to select, clean and cook the fish. This added information helps the consumer reap the benefits of eating fish and shellfish while being confident that they are reducing their potential exposure to bioaccumulative pollutants. It is important to remember that recommendations on safe levels of fish consumption for organic pollutants are often based on the assumption that proper cleaning and cooking advice has been followed. Cleaning and cooking procedures do not reduce the mercury content of fish. Fish consumption advisories are updated periodically and can be found at the following web site:

http://epa.gov/waterscience/fish/states.htm

Federal Efforts

In March 2004 FDA and EPA jointly issued national fish consumption advice in a brochure entitled, *What You Need to Know about Mercury in Fish and Shellfish* for women who might become pregnant, women who are pregnant, nursing mothers and young children. The advice applies to both commercial and noncommercial fish. Beginning in summer of 2004, EPA and FDA began distributing the brochure in English and Spanish with additional languages planned for late 2005. Approximately 6 million copies of the English version (lesser amounts in Spanish) have been distributed by mail and at national medical conferences. Over 170,000 members of the U.S. medical community, as well as State, Tribal, local health departments, WICs, Pregnancy Planning Centers, and other public health organizations received brochures. Brochures can also be ordered by contacting the EPA document distribution center at 1-800-490-9198. For further information regarding the advisory, visit the EPA Fish Advisory

Program website at www.epa.gov/ost/fish. EPA and FDA will continue to promote the advisory at major medical and environmental health conference around the country throughout 2006.

Outreach materials developed by EPA and ATSDR were also sent to physicians and can be found at:

www.epa.gov/waterscience/fishadvice/advice.html

In 2003, the University of Illinois at Chicago School of Public Health completed the PCB Risk Communication and Outreach Project, which was funded by EPA's Persistent, Bioaccumulative Toxics (PBT) Program. This project identified the need for consistent, culturally-sensitive fish consumption information for urban ethnic fishers in the Lake Michigan basin who remain uninformed (and possibly overexposed) about contaminants in the fish they use to supplement their diets. Recognizing this, the PBT Program has started a project to scale up efforts to enhance outreach to ethnic and minority fishers in three States, including the Great Lakes States of Michigan and Wisconsin.

In 2004, the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) completed a report on dioxin contamination in Lake Superior fish, funded by the PBT Program. The report identified low levels of several dioxins and furans in fish used for both subsistence and commercial purposes by Great Lakes Tribes. In addition to the possibility of excess exposure, the report also pointed out the need for clarity and consistency in fish consumption advisories from multiple jurisdictions.

Approximately every 18 months, EPA hosts the National Forum on Contaminants in Fish which is attended by Federal, State and Tribal agency staff as well as members from the regulated community. Each forum has a session on Risk Management Issues which include discussions of the special outreach needs of particular sub-populations. At the January 2004 forum, this session included presentations on risk communications to diverse populations in an urban setting and risk communications for medical practitioners. The proceedings from this forum can be found at:

www.epa.gov/waterscience/fish/forum/2004/

The most recent forum was held on September 18-21, 2005 in Baltimore, Maryland. More information can be found at:

www.epa.gov/waterscience/fish/forum/2005/

Other Resources

In addition to Government issued fish consumption advisories, additional outreach materials have been distributed to Great Lakes fish consumers. For example The Illinois-Indiana Sea Grant issued a fish consumption information brochure in 2003 entitled "The ABCs of PCBs: Know Your Catch". The brochure was published in English, Polish, Spanish and Korean and was distributed to Great Lakes fishermen.

In 2002, the Lake Erie Forum published a fish consumption brochure entitled “A Family's Guide to Eating Fish from the Lake Erie Basin,” targeting women and children in this area. These types of outreach efforts exemplify how the Federal government, States, and local communities are working together to better inform the public of possible health risks and benefits.

Currently, the Illinois-Indiana Sea Grant is undertaking a project which focuses on fish consumption risks and benefits through education of children and their families via teacher education and dissemination through community-based health expos targeting this vital health issue. In order to make information on fish contaminants more readily available to subsistence anglers and to pregnant and nursing mothers, an education program will be developed to provide critical human health guidance. The information-based expos created by students with their teachers' guidance will:

- increase awareness of the risk among populations who fish for subsistence; and

- provide knowledge and improve understanding about how to properly clean potentially contaminated Lake Michigan fish, especially for those populations which are at most risk, such as pregnant and nursing mothers and their young children.

The U.S. will continue to identify targeted sub-populations which require targeted outreach regarding the benefits and risks associated with consuming Great Lakes fish and wildlife. Appropriate outreach materials will be developed which can more accurately and appropriate these benefits and risks in a culturally sensitive manner.

RECOMMENDATION C

Select and promptly implement programs in both the United States and Canada that would substantially reduce the deposition of mercury in its reactive gaseous form in the Great Lakes region; and also pursue multi-lateral strategies for further control of this persistent toxic substance on a global basis.

RESPONSE

The U.S. considers all air emissions of mercury, in any chemical form, to potentially contribute to atmospheric deposition of mercury to the earth and its surface waters. Elemental mercury can be converted to reactive gaseous mercury in the atmosphere, and elemental mercury can be dry deposited, particularly in leaf litter in deciduous forests. Dry deposition of mercury vapor from the atmosphere is not a well understood as wet deposition and could potentially rival wet deposition (of reactive gaseous mercury).

Through time, the U.S. has undertaken many steps to reduce national releases of mercury. These have resulted in reductions of both elemental and reactive gaseous mercury:

- Use of mercury within the U.S. economy has decreased by greater than 95 percent since the 1960s. Mercury use has been discontinued in pesticides, paints, certain batteries, and medicines.

- U.S. human-caused emissions of mercury to air have decreased 45 percent since 1990.

- On December 19, 2003, EPA issued final regulations to reduce mercury emissions from chlorine production plants that rely on mercury cells (68 FR 70903, codified at 40 C.F.R. part 63, subpart IIIII). The regulations establish numerical emission limits for total mercury from existing vents, and also include a set of rigorous work practice standards, representing the best practices from the industry, to mitigate fugitive mercury releases. These standards are more stringent than were required by a pre-existing regulation that covered this source category. Today, there are nine such plants in the U.S., as compared to about 20 in the early 1990s.

- Mercury emissions from municipal waste combustors and medical wastes incinerators have been reduced by more than 90 percent as a result of regulations issued under the Clean Air Act. These facilities were an important source of reactive gaseous mercury to the atmosphere in the U.S.

Reduced releases of mercury may help explain significant reductions in mercury levels since the 1970s within Great Lakes fish (trout and smelt) and birds (herring gulls).

In March 2005, the U.S. became the first country in the world to regulate mercury emissions from coal-fired power plants. EPA issued the Clean Air Mercury Rule, which is the first ever Federal rule to permanently cap and reduce mercury emissions from coal-fired power plants. Under the Clean Air Mercury rule, the first phase cap is 38 tons, and it takes effect in 2010. Mercury reductions under this cap will be achieved largely as the result of “co-benefits” of reducing emissions of sulfur dioxide and nitrogen oxides under the Clean Air Interstate Rule. 70 Fed. Reg. 25,162 (May 12, 2005) (Clean Air Interstate Rule); 70 Fed. Reg. 28,605 (May 18, 2005) (Clean Air Mercury Rule). Coal-fired power plants are expected to reduce beyond the first phase cap of 38 tons and emit about 31 tons in 2010. They are expected to reduce beyond what is required in order to bank allowances for future years. Moreover, we anticipate substantial reductions in the emissions of reactive gaseous mercury as the result of the first phase cap. The final cap in the Clean Air Mercury Rule on mercury emissions from coal-fired power plants comes into effect in 2018. When fully implemented, emissions from these sources will be reduced from 48 tons per year to 15 tons, which is a reduction of nearly 70 percent. This multi-pollutant approach creates strong incentives for the power sector to install a significant number of scrubbers and Selective Catalytic Reduction (SCR) technologies. These controls particularly reduce reactive gaseous mercury, the form that matters most for reducing U.S. deposition. EPA included information as to the amounts of mercury deposition, and the impacts of CAIR and CAMR in reducing that deposition, in a rulemaking under the Clean Air Act concerning domestic power plants. (See 70 Fed. Reg. 15994 (March 29, 2005); Technical Support Document: Methodology

Used to Generate Deposition, Fish Tissue Methylmercury Concentrations, and Exposure for Determining Effectiveness of Utility Emissions Controls):

www.epa.gov/ttn/atw/utility/depo_fishmehg_exp_oar-2002-0056-6186.pdf

Another source of emissions being addressed is the melting of auto scrap that contains mercury switches at steel production facilities. EPA is involved with efforts to encourage the removal of these switches before the scrap goes to the steel production facilities, and also is developing a regulation to control emissions from these facilities.

In recent years, the U.S. has contributed significantly to international activities to promote greater prevention of mercury releases. Since 2002, for instance, the U.S. has contributed significant resources to support the United Nations Environmental Program (UNEP) and its participating nations with activities to address mercury pollution, including completing the Global Mercury Assessment report, conducting awareness raising workshops, development of guidance materials, and undertaking other information-sharing activities. During 2005, in addition to continuing general support for the UNEP Mercury Program, the U.S. is considering and developing new initiatives among countries and other stakeholders to support collaborative activities, including information sharing among interested nations to assist them with addressing a variety of mercury issues, such as risk assessment, emissions inventories, combustion of coal, small-scale and industrial-scale mining, chlor-alkali production, and the use of mercury in products.

There have also been a variety of regional projects aimed at mercury reduction. Below are four examples of these type of projects:

1. Working under a 2002 Pollution Prevention Demonstration grant from EPA Region 5, the Minnesota Technical Assistance Program (MnTAP) used Hospitals for a Healthy Environment (H2E) tools to demonstrate the effectiveness of pollution prevention at health care facilities. As a result of MnTAP's work through this project, at least 34 Minnesota health care facilities (22 percent of Minnesota hospitals) are engaged in documented pollution prevention efforts at some level. Thirteen facilities have signed on as H2E "Partners" and 29 have either eliminated 75 percent of their mercury or are working toward that goal. These facilities have eliminated 394 pounds of mercury, 851 gallons of hazardous chemicals, and 250,000 pounds of solid waste. A number of outreach efforts and communication techniques were used to reach the healthcare audiences. Working through the University of Minnesota's Academic Health Center and the healthcare trade associations proved most effective. H2E provides useful tools and good publicity to encourage pollution prevention in the healthcare sector. MnTAP worked with H2E to develop some of its products, including the Chemical and Solid Waste Minimization Plans. The full report on this project is available on the MnTAP Web site:

   http://www.mntap.umn.edu

2. EPA Region 5 continues to participate in statewide dialogues in Michigan and Indiana to develop statewide recycling infrastructures for recycling electronic waste, which is a key source of lead, mercury and other metal emissions (and possibly a source of some brominated flame retardant emissions, as well). State and local governments, recyclers, reuse organizations, manufacturers, non-profits, and trade associations participate in these dialogues. The stakeholders consider and discuss existing information and proposed changes in four areas: educational resources (to include in a tool kit with case studies and models), funding, logistics and regulatory approaches, including possible landfill bans. The groups also target public sector purchasing of greener electronics, and are working to identify a common data standard to report the successes of local electronics recycling collection events throughout the region.

3. In November 2004, EPA Region 5 published a Mercury Pollutant Minimization Program (PMP) guidance to address situations where a PMP is required in a State-issued NPDES permit for a Publicly Owned Treatment Works (POTW). The guidance is needed to assist the States in implementation of stringent limits being imposed as a result of the Great Lakes Water Quality Guidance (GLWQG). Many POTWs will not be able to demonstrate compliance with these limits and will need to obtain variances. As a variance condition, these POTWs will need to implement a PMP to address sources of mercury within their systems. The guidance was developed in coordination with the Region 5 States, in order to promote a consistent approach for these programs. It includes recommendations on sectors that should be addressed (e.g. medical and dental facilities, schools, laboratories, etc.), and potential approaches for controlling these sectors. Decisions as to specific PMP requirements in a community will continue to be made by the State and local POTW.

   The guidance has been used by the Indiana Department of Environmental Management in development of its Streamlined Mercury Variance rule, which is expected to be finalized in June 2005, as well as by the Wisconsin Department of Natural Resources as it develops its State-specific Mercury PMP Guidance. Currently, 33 out of 230 major POTWs in the Great Lakes Basin have GLWQG-based mercury limits and PMP requirements. The goal is for over 200 to have them by 2007. The region will continue to track POTW effluent levels in relation to the underlying water quality criteria, but the effects of PMP implementation are expected to be seen in sludge before POTW effluent. The Region has begun to establish a baseline of mercury in sludge from POTWs in the basin, and has set a goal that by 2008, levels of mercury in land-applied sludge will have decreased by 25 percent.

4. In 2003 and 2004, using a coordinated approach with State health departments, local hazardous waste collection events, and a previously developed audit tool, EPA Region 5 Waste, Pesticides and Toxics Division collected approximately 1,000 pounds of mercury from Wisconsin and Michigan schools.

CHAPTER 4: ECOSYSTEM INTEGRITY

This chapter addresses the ecosystemic changes occurring in Lake Erie and urges the governments to continue researching this phenomenon and makes the following recommendation:

RECOMMENDATION

The Commission recommends that Governments continue to fund binational research efforts begun in 2002 and 2003 to better understand changes in the Lake Erie ecosystem. The institutional model provided by the Lake Erie Millennium Network should be considered for adaptation and adoption on the other Great Lakes to foster enhanced binational cooperation and communication.

RESPONSE

The U.S. Government shares the IJC's concern with the changes taking place within the Lake Erie ecosystem. The restoration of Lake Erie through the combined efforts of Federal, State and Provincial actions is one of the great environmental success stories of our time. Troubling changes which are now occurring are posing a threat to this success and are being addressed directly by the Parties.

The changes in the Lake Erie ecosystem which has raised concerns is the occurrence of the "dead zone," an area in the central basin of Lake Erie where the oxygen at the bottom of the lake goes below 1 milligram/liter, a level at which no fish and few other organisms can survive. Monitoring by GLNPO aboard its research vessel the *R/V Lake Guardian* helped identify this problem which is associated with observed rising levels of phosphorus in Lake Erie. The appearance of the "dead zone" is not a new problem; it is something that U.S. agencies are quite familiar with and have successfully addressed in the past, when phosphorus abatement programs were successful in greatly improving Lake Erie's water quality.

In response to the discovery of rising phosphorus levels, GLNPO launched the Lake Erie Supplemental Study of Trophic Status, which began on June 17, 2002. This study includes Lake Erie experts from more than twenty U.S. and Canadian universities and institutions. The study is an initial investigation to identify the most probable causes of the problem, and will most likely lead to more targeted research. Preliminary data have been provided to EPA and a final report is due in 2005. To date, the available information does not indicate any substantial or significant increases in loadings of phosphorus or other nutrients to Lake Erie from external sources, but this is still an area of investigation. Researchers are investigating several hypotheses including the theory that zebra and quagga mussels (non-native invasive species) may be a cause of the problem. Preliminary results, although inconclusive, have lent some support to this hypothesis, but the cause or causes may be more complex.

To further our understanding of the Lake Erie ecosystem, NOAA's Great Lakes Environmental Research Laboratory, in collaboration with researchers in the U.S. and Canada, is conducting one of the largest, most comprehensive Lake Erie research field

programs. The two-year project, the International Field Years on Lake Erie, started in April 2005 and includes a series of ship cruises, as well as field and laboratory work. Researchers will try to better understand the impact of the “dead zone” on the food web in this region, including fish. The whole-lake research effort will focus primarily on issues related to the effects of oxygen depletion (hypoxia/anoxia) on food-web interactions and fish production in the central basin, as well as the causes of harmful algal blooms in the west basin. Two major partners in the effort are GLNPO and the National Sea Grant College Program.

In addition, the USFWS led Great Lakes Basin Ecosystem Team binational partnership is pursuing and demonstrating success for Lake Erie assessment and restoration of shared priority fish, wildlife, and habitat needs, including for Western Lake Erie island conservation, lake sturgeon restoration, climate change impacts, coastal habitat restoration, migratory bird stopover sites, and the emerging issue of wind power generation (http://greatlakes.fws.gov/).

Lake Superior

Pursuant to the decision of the Binational Executive Committee to ensure that each lake basin has a monitoring strategy, the Lake Superior LaMP Workgroup has formed a coordinated monitoring committee. This Committee has been meeting on a regular basis to formulate a monitoring strategy for Lake Superior, assess where and what the highest priority monitoring needs are, and how to best achieve these monitoring goals. This monitoring committee is comprised of a binational group of scientific experts who work with the other ecosystem committees of the Lake Superior Workgroup, including aquatics, habitat, terrestrial wildlife and chemical committees.

Lake Ontario

The Lake Ontario LaMP has a history of binational monitoring cooperation and continues to implement this, with the three efforts that have been ongoing since 2003 to improve understanding of the Lake Ontario ecosystem. They are the Lake Ontario Atmospheric Deposition Study for developing a more detailed understanding of atmospheric deposition processes within the Lake Ontario, the Lake Ontario Lower Aquatic Foodweb Assessment for developing a better understanding of the changes that are occurring in Lake Ontario's lower aquatic foodweb and its ability to support fish populations, and the Interagency Laboratory Comparison Study helping to understand differences in analytical and sampling methods.

Lake Michigan

The Lake Michigan Monitoring Coordinating Council was established to enhance coordination, communication, and data management among agencies and other organizations that conduct or benefit from monitoring efforts in the Lake Michigan basin in the interest of supporting the Lake Michigan LaMP. The Council has 31 members representing Federal, State, Tribal, and local governments, nonprofit watershed groups, and other environmental organizations, educational entities, and the regulated community. The Council meets twice each year in locations throughout the watershed.

Council meetings, biennial conferences, and feedback from constituents shape the Council's work plan and activities. The Council will develop goals, each with an active working group, whose broad membership will expand the core Council membership.

In 1999, four short-term working groups were created to develop information to move the Council forward: Data Inventory and Analysis, Monitoring Objectives, Watershed Pilots, and Outreach and Collaboration. The progress of those short-term working groups set the stage for the development of a new Council operating framework in 2001.

The new Council framework has been developed to increase coordination between appropriate monitoring entities, allow the development of a strategic plan for monitoring, and add value to the individual efforts of the Council's member organizations. The new Council framework takes advantage of the logical interactions between the various resource-based monitoring entities and other affected stakeholder groups. The working groups formed under this new framework will build on the efforts to coordinate monitoring within individual resources by groups such as the LaMP Committees, the Wisconsin Groundwater Coordinating Council, and the Great Lakes Fishery Commission. Each of these resource based working groups will coordinate existing monitoring networks around several common considerations: monitoring objectives; spatial, temporal and parameter network design; methods comparability; quality assurance and control planning; database sharing; and data analysis approaches. Currently, an aquatic nuisance species basin survey is being completed.

Lake Huron

The Lake Huron Binational Partnership is performing many of the activities necessary to develop a formal LaMP for Lake Huron. Monitoring is currently coordinated using a combination of focused domestic studies and binational basinwide approaches. Canada's Federal-Provincial working group is pursuing several monitoring activities, including the Southeast Shore Project, which is investigating causes of beach closings along the southern Canadian coastline in Lake Huron. The U.S. has initiated the Lake Huron U.S. Agencies Coordination Meeting which has begun the development of a coordinated monitoring and management plan for the domestic U.S. . An expected infusion of resources in FY 2005 will help the U.S. enhance this effort. Building upon these domestic efforts, binational data sharing occurs as part of the biennial progress reporting under the Lake Huron Binational Partnership. The upcoming Lake Huron Symposium scheduled for October 2006 in Ontario, Canada will bring together Lake Huron researchers for a technical discussion on the status of the Lake Huron ecosystem and will culminate in a peer-reviewed technical report that will inform and guide future management efforts. In addition, the Partnership is currently developing plans for more extensive coordinated monitoring to take place in 2007. All of these efforts are closely linked with the binational efforts of the Great Lakes Fishery Commission's Lake Huron Teams. Through these efforts, Lake Huron will be supporting data sharing and monitoring coordination activities which are similar to the Lake Erie Millennium Network.

Appendix 1 - Great Lakes Human Health Effects Research Program Studies

Several studies evaluating the health effects of eating fish from various locations within Great Lakes Basin have been completed or are on-going. Here are examples of ATSDR's funded institutions and research topics:

The New York Angler Cohort Study--Exposure Characterization and Reproductive Developmental Health **conducted by John Vena, Ph.D. of State University of New York at Buffalo**

The New York State Angler Cohort Study (NYSACS) is a population-based study established to assess the association between past and current consumption of contaminated sport fish, from the Great Lakes, and short-and long-term human health effects. The research program's current objectives include:

- Establish a cohort of African-American and Hispanic anglers from the Buffalo River and Niagra River.
- Conduct a pilot study of 5th-8th graders and begin development of Great Lake Environmental Education and Community Action Initiative.
- Continue the study of the prospective pregnancy cohort study (to include other at-risk women) analyzing the relationship between consumption of contaminated fish from Lake Ontario and two sensitive reproductive outcomes: time to pregnancy and early pregnancy loss.
- Assess biomarkers of exposure and/or susceptibility to dioxin-like compounds and biomarkers of immune status.
- Continue the tracing of the entire cohort and conduct passive follow-up through vital records.
- Continue to implement dissemination and communications efforts in concert with the New York State Health Department.

PCB, DDE, Mirex, and HCB Exposure Among Native American Men and Women from Contaminated Great Lakes and St. Lawrence River Basin Fish and Wildlife and Neurological Effects of Environmental Exposure to PCBs **conducted by Edward Fitzgerald, Ph.D. of the New York State Department of Health**

An epidemiologic study in an established cohort of American Indians, the Mohawk Indian Tribe, which investigates the association between the consumption of locally caught fish and wildlife and body burdens of PCBs , 68 PCB congeners, DDE, mirex, and HCB in men and women who live along the St. Lawrence River and its tributaries.

In order to investigate the hypothesis that exposure to PCBs via fish consumption, close proximity to a hazardous waste site, and other sources has resulted in elevated body burdens of PCBs and has caused PCB congener-specific and age-specific neurological

effects, the investigators propose to recruit 75 men and 75 women, 55-74 years of age from an area with historically high PCB contamination. They will recruit a comparison group of equal number, matched to the study population regarding age and gender. Their objectives are to estimate cumulative and peak dietary and residential exposure of PCBs among the study population using current and estimated air concentrations. A questionnaire regarding fish consumption will be used to estimate PCB exposure via fish. Blood samples from these individuals will be analyzed for 109 PCB congeners levels and correlated the environmental levels using "fingerprinting" methods. A neuropsychological test battery will be performed on the subjects and the investigators will attempt to correlate with the exposure estimates and serum PCB levels. Serum PCB levels and neuropsychological function will be compared to a matched control group.

Great Lakes Fish as a Source of Maternal and Fetal Exposure to Chlorinated Hydrocarbons **conducted by Donald P. Waller, Ph.D. of the University of Illinois at Chicago**

The purpose of this study is to determine the effects of consumption from possibly contaminated fish (PCB's, DDT/DDE and dieldrin) on pregnant woman of African-American descent and their newborns. The subject population will consist of a control and a fish consuming group who will be identified at the U. Chicago Lying-in Hospital, U. Ill Hospital, Miles Square Clinic and Altgeld Gardens Clinic (and possible other area clinics). The subjects are interviewed and then followed throughout pregnancy to term. Biological specimen collections consists of maternal and fetal cord blood, placenta, breast milk, adipose tissue and meconium. The investigators will evaluate meconium as a biologic specimen to predict infant in utero exposure to toxic chemicals.

Longitudinal Assessment of Neuropsychological and Thyroid Function in Aging Great Lakes Fisheaters and a Prospective Study of Health Outcomes in Asian Americans Project Description **conducted by Susan L. Schantz, Ph.D. of the University of Illinois at Urbana-Champaign**

The objectives of the proposal are to:

- Complete follow-up neuropsychological assessments of aging Lake Michigan fisheaters, statistically analyze the data and prepare manuscripts for publication.
- Establish a cohort of Asian American (Hmong people from Laos and Cambodia) men and women of childbearing age who have a high probability of consuming contaminated fish from the Fox River and/or other local polluted water.
- Describe the reproductive experiences of this population. Determine fish consumption practices of this population.
- Determine the distribution of serum PCB levels in a subset of the cohort.
- Examine changes in serum PCB and serum thyroid hormone levels during pregnancy.

- Evaluate health outcomes in infants born to the women in this cohort.

In the first study the researchers will evaluate cognitive and motor function in aging (50 to 70 plus years old) fisheaters and in their age- and sex-matched non-fisheating controls. The two groups will be tested using a neuropsychological assessment battery designed to detect subtle deficits in cognitive and motor functioning.

In the second study of this research project some of the activities will include determining the levels of PCBs in mothers' blood during pregnancy and at delivery; samples will also be collected from the umbilical cord. Mother's blood will also be examined to assess thyroid status in relation to PCB exposure. The cochlear function will be assessed in the newborns within 24-48 hours of postnatal age. Physical measurements (height, weight, head circumference) will be obtained at birth, at 6, 9, and 12 months. Behavioral assessment will be done in the newborns (Brazelton Neonatal Behavioral Assessment Scale) and at 6 and 12 months of age (Bayley Scales of Infant Development). Cognitive testing will be done at 6 months of age (Fagan Test of Visual Recognition Memory). Further cognitive testing will be done at 9 and 12 months of age

Behavioral Effects of Consumption of Lake Ontario Fish: Two Methodological Approaches - Continuation of A Longitudinal Study Testing 4 and 6 Year Olds **conducted by Thomas Darvill, Ph.D. of State University of New York at Oswego**

This is a longitudinal-sequential study involving behavioral testing of three cohorts of children born to women from Oswego County, New York, who consumed large amounts of Lake Ontario sportfish over their lifetime. Initial data from the Oswego study of newborns (supported by ATSDR) show that newborns from mothers who consumed about 40 equivalent pounds of Lake Ontario fish scored more poorly on reflex, automatic, and habituation clusters of the Neonatal Behavioral Assessment Scale than those from mothers who consumed 40 PCB equivalent pounds of Lake Ontario fish or no fish. These data represent the first replication and extension of the neonatal results of the Lake Michigan Maternal Infant Cohort study by Jacobson et al. (1984). More recent data from the Oswego project indicate that prenatal exposure to PCBs impairs cognitive functioning in children as early as 1 and 3 years of age. To date, the investigators have obtained behavioral data at 3, 6, 12, 24, 36, 51, and 54 months of age. Funds are requested to continue the assessment of behavioral and cognitive development of the children in the study as they enter elementary education years (grade K-2).

Health Risks from Consumption of Great Lakes Fish **conducted by Lawrence J. Fischer, Ph.D. of Michigan State University**

This research grant seeks to continue and expand mercury exposure research supported by the ATSDR Great Lakes Human Health Effects Research Program. This research effort will provide additional information needed regarding mercury exposure and possible health risks to women of childbearing age living in the Great Lakes Basin. This is important because the developing human fetus is known to be particularly

susceptible to the neurotoxic effects of methylmercury, the primary form of mercury present in fish. The proposed research has been divided into 3 subprojects, each with a specific focus. The subprojects are as follows:

Subproject 1. Determination Using Segmental Hair Analysis of the Time Course of Exposure to Methylmercury in Pregnant and Non-Pregnant Women: The goal of this proposed research is to determine the time course of mercury exposure in pregnant women throughout the entire period of gestation. Further, non-pregnant women have been recruited for studies using the same sampling and analytical methodology so that a comparison between the two groups can be made. This comparison will provide information on mercury exposure and toxicokinetic differences that may be related to pregnancy itself.

Subproject 2. Mercury Hair Levels at Mid-Pregnancy and Risk for Preterm Delivery in a Cohort of Michigan Women: The goal of this proposed research is to examine the relationship between methylmercury and early pregnancy loss in particularly susceptible populations. This study will also provide mercury body burden data for a population that has traditionally been understudied, African-Americans.

Subproject 3. Develop and Implement a Pilot Project for Monitoring the Michigan Population for Mercury Exposure: A pilot project will be undertaken to investigate the feasibility of statewide random sampling of Michigan women to determine baseline mercury levels. Additionally, historical data regarding mercury levels in various species of freshwater fish obtained through the State of Michigan yearly fish monitoring effort will be analyzed to evaluate possible regional differences in fish contamination and to evaluate in a systemic way, the chronology and regionality of mercury-related fish contamination in the State. Results from these studies will permit a much better understanding of fish contamination and consumption as they relate to methylmercury exposure in women.

Consortium for the Health Assessment of Great Lakes Sport Fish Consumption **conducted by Henry A. Anderson, M.D. of Wisconsin Department of Health and Family Services.**

This project continues to examine the association between sport caught fish consumption in the diet of Great Lakes area residents and serum levels of 1) PCBs, 2) DDE, 3) dioxins, and 4) furans which have been detected in Great Lakes contaminated fish. The area residents consist of a cohort of frequent consumers of Great Lakes fish (*charter boat captains and their spouses with n = 1868 households, and Wisconsin anglers with n = 129 households*) and infrequent consumers (*n = 1,300 households from the same community as the captains*). In addition, serum PCB and DDE levels are being evaluated in the group to determine if an association exists between the serum levels and 1) birth outcomes, 2) serum thyroid and steroid hormone levels, and 3) reproductive outcomes (e.g., semen quality). Risk communication has also been a component of the study.

The cohort had blood serum samples drawn for contaminants and received a phone interview dealing with 1) fish consumption, 2) reproductive history, 3) health advisory

awareness, 4) risk factors (e.g., smoking), and 5) demographic information. Of the frequent consumers, 1868 households completed the phone interview with more than 500 individuals participating in the blood drawing. Of the infrequent consumers, 1,300 households completed the phone survey and 99 of these individuals had blood drawn.

Results have shown the PCB and DDE levels were higher in frequent consumers of Great Lakes fish when compared to the infrequent consumers. A pilot study also revealed that frequent consumers had higher serum dioxin, furan, and coplanar PCB levels than a comparison group.

Assessing Effects of Human Reproductive Health of PCB Exposure via Consumption of Great Lakes Fish **conducted by Wilfried Karmaus, M.D., MPH of Michigan State University**

The study design is a cross-sectional and longitudinal observational assessment of the effects of PCB exposure, both current and in utero, on reproductive health. The main goal of this project is to assess fecundability and reproductive success in two cohort studies of individuals selected from two source populations at elevated risk of exposure to PCBs via consumption of Great Lakes sport-caught fish. A secondary goal is to pilot a case control study of low sperm count in relation to the same exposures. In the two cohort studies, investigators aim to examine specific hypotheses about the relationship of PCB exposure to reproductive health occurring directly through consumption of sport-caught Great Lakes fish, and occurring indirectly through in utero exposure. PCB exposure, in both the cohort and case-control studies will be assessed by a detailed questionnaire on fishing practices and through serum analysis for PCBs. To assess reproductive health in the cohort studies, investigators will examine time to pregnancy, sex ratio and selected correlates of fertility, including serum levels of testosterone, LH and FSH in men, and cyclic levels of urinary progesterone, estradiol, LH, and FSH in women. The first population (Cohort A), which is already assembled and will be expanded in the next fiscal year, is a sample of couples, one or both of whom is a licensed angler, and individuals resident in one of ten Michigan counties abutting one of three of the Great Lakes. Cohort A consists of couples and individuals who completed a questionnaire on sports fish eating practices and who indicated plans to have a child within the next five years. The second population (Cohort B), to be assembled, consists of adult offspring of an existing cohort of Michigan anglers interviewed and assessed by the Michigan Department of Health, starting in the 1970's. In Cohort A, the exposures of interest will be assessed in the couples themselves; in Cohort B, the exposures of interest are in the female member of the couple, with emphasis on exposures that are likely to have occurred while the woman was in utero or exposed to breast milk. Couples from both cohorts who are planning pregnancies will be followed prospectively. Specific reproductive outcomes will be assessed in relation to both serum PCB levels and to self-reported Great Lakes fish consumption.

Ojibwa Health Study II - Epidemiology, Laboratory Toxicology, and Outreach **conducted by John Dellinger, Ph.D., University of Wisconsin-Milwaukee**

This proposal continues the study of the original Ojibwa Health Study on dietary fish containing methylmercury and organochlorines (polychlorinated biphenyls and pesticides) and their correlation with adverse health outcomes. The first three years (Phase I) of the project focused on setting up the participating Tribes and conducting laboratory toxicological studies. The second three years (Phase II) continued those studies with the emphasis on completing sample collections. As part of the proposed continuation of the study, the investigators will conduct neurobehavioral assessment of individuals who provide biologic samples because of the known relationship between high levels of fish contaminants and neurologic dysfunction. The next three years (Phase III) the investigators will complete all chemical analyses on biologic samples and report the results back to the Tribes. Health promotion and risk communication strategies will be implemented with the input from The research program will also support the ongoing Tribal research aimed at monitoring contaminant levels in the local fisheries run by the different Tribes. The specific aims of the research falls in two categories: human epidemiology studies and outreach activities.

PCB Congener and Metabolite Patterns in Adult Mohawks: Biomarkers of Exposure and Individual Toxicokinetics **conducted by Anthony DeCaprio, Ph.D., State University of New York at Albany**

To conduct statistical analyses of congeners-specific serum PCB data for ~750 adult Mohawk Indians using multivariate techniques and to compare the results with those for other published relevant databases to identify unique populations and environmental variables in the Mohawk cohort.