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UWindsor Administrator
University of Windsor, scholarship@uwindsor.ca

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effects must be documented relative to long-term exposure to multiple persistent toxic chemicals.

With regard to human health, the economics of the fisheries, and the overall health of the ecosystem, the solution is also simple: stop the input of contaminants. The world is well aware that attention should continue to be placed on the control of known point sources. As an example, the report of the IJC's Pollution from Land Use Activities Reference

Group (PLJARG) in North America has served as a strong basis for the development of new strategies to cope with non-point source pollution. However, the focus of most studies remains limited to conventional pollutants. The next step for the world community is to focus on the control of toxic substances for both point and nonpoint sources and to monitor for emerging pollutants. It is not enough that the scientific community continues to recognize the interrelationships of our

environment through an "Ecosystem Approach." The regulatory community, through political processes, must respond by implementing policy guided by a perspective of our interrelated environment which extends beyond national boundaries or environmental compartments and must arrange their institutions accordingly. The world community must adopt a philosophy of prevention of toxic substance contamination rather than merely reacting to environmental crises.

RECOMMENDATIONS

Chronic Effects of the Toxic Chemicals in Large Lakes:

1. A new thorough international effort is required now to eliminate the major retrievable sources of persistent toxic chemicals from not only large lake ecosystems, but the global ecosystem. A preventative approach must be taken rather than the present reactive approach which currently requires absolute proof of a cause/effect relationship, particularly proof of excessive risk to chronic human disease.
2. Human exposure and chronic health effects must be documented relative to long-term exposure to multiple persistent toxic chemicals in order to continue with regulations and decisions that require these data.
3. An inventory of sources for persistent toxic chemicals which are now prevalent within the ecosystem must be accurately obtained on a local, regional, national and global basis.
4. Hazard assessment protocols must be developed and used cooperatively on an international basis to allow for worksharing and to provide internationally consistent legal decisions on toxic chemical control.
5. International control agreements are still required to:
 - a. eliminate hard pesticides such as aldrin/dieldrin, lindane and toxaphene; and
 - b. provide for consistent and complete destruction of the major retrievable sources of persistent industrial chemicals.
6. Decisions on toxic chemical control must be based on a thorough, honest and complete public disclosure of information.

Consideration of Toxic Substances in Fisheries Management:

As aquatic ecologists, limnologists, and fisheries scientists and managers, we are often frustrated in our efforts to convince the public

and decision makers of the importance of our large lakes or of our aquatic resources in general. However, when the public are convinced of the value of the resource, they will support the protection of that resource. We must convince them of the value of our large lakes.

1. More research is needed to determine the value, both economic and social, of our large lakes.
2. A responsible organization is needed to coordinate information for the public on toxics in fish.
3. More research is needed to establish realistic, long-term tolerance levels for fish health, aquatic ecosystem health, using micro- and mesocosms, and for the health aspects related to human consumption of fish.
4. Standardization of monitoring contaminants in fish is needed for comparing long-term trends and an early warning system.
5. Continuing efforts are needed to reduce or stop inputs of contaminants to large lakes from both point and nonpoint sources.
6. Develop a procedure to bring the public, possibly through advisory groups, into working groups with scientists and resource managers to address contaminant problems.

Prevention of Toxic Contamination of Large Lakes Toward a World Management System for Sustainable Development:

1. Historically, large lakes represent a vital economic resource which has thus far not been fully appreciated.
2. There is a striking similarity between the socio-economic and political characteristics of the world's large lakes systems. This similarity is reflected in the multi-jurisdictional or international institutional arrangements developed to manage those systems.
3. The management of this resource is frequently rendered difficult by a multitude of political boundaries, often including

- international boundaries. Managing such transboundary environmental resources represents a major challenge to existing political institutions; therefore, a priority setting methodology to guide research and management efforts is essential. In the Great Lakes Basin, the Science Advisory Board and the Council of Research Managers are designed to serve this function. Concerted action should be directed at developing the membership of the Science Advisory Board and the Council of Research Managers so that their recommendations are incorporated into the research priority-setting mechanisms of the governments.
4. It is recommended that research be undertaken into institutional alternatives for integrating scientific inquiry and public policy into a single system for water management in large lake systems.
5. Further examination and research from socio-economic and legal-political perspectives must be undertaken to devise laws, policies and programs to protect the health and safety of citizens and which recognizes the primacy of the ecosystem boundaries while accommodating the realities of political jurisdiction.
6. Pollution is particularly threatening to large lakes, which tend to become a "sink" for pollutants from all sources. Traditionally pollution sources have been characterized by environmental medium but it is becoming increasingly clear that the pathways of pollutants can lead through several media and that controls consequently must take a cross-media approach.
7. Research is needed to devise ways to prevent the formation of new hazardous wastes and to eliminate the hazards associated with those which already exist. Some corporations have substantially reduced the use of resistant toxics in manufacturing by substitution, reduction and complete recovery of those substances, at the same time protecting the environment and improving corporate

profits. Other corporations should be challenged to do the same.

8. Intensive agricultural practices not only result in nonpoint pollution of air, land and water but also result in overproduction of foodstocks. Policy and technical research is needed to develop and apply socially and economically feasible alternative agricultural practices.
9. The huge mass and diversity of environmental data overwhelm our ability to comprehend their meaning. Computer-based data and information management systems are needed to structure and organize this mass of information so that it becomes immediately useful to decision makers.
10. A fostering of communication among international commissions addressing shared aquatic resources would provide exchange of information on their successes and failures. Therefore, it is recommended that a conference of international commissions be convened to address institutional arrangements and the role of international commissions in addressing prevention and remediation of transboundary pollution.
11. Large lakes can only be successfully protected if citizens are aware of the importance of the issue and have the means of expressing their awareness. Governments are encouraged to provide access to reliable information and to provide appropriate opportunities in their decision-making processes for participation by the public.
12. Developing countries appear to be readily accepting the technology of industrialized countries often without full recognition of the pollution consequences. There is an urgent need for communication between industrialized and developing countries on pollution prevention so that the pollution experiences of the more industrialized nations are not readily repeated.
13. Continuous and integrative scientific research on large lakes should be a high priority for governments.
14. The policy of the Great Lakes Water Quality Agreement is reaffirmed, specifically the following section: "The philosophy adopted for control of inputs of persistent toxic substances shall be zero discharge." It is further recommended that governments implement programs advocated by the Royal Society of Canada and the National Research Council of the United States in their review of the Great Lakes Water Quality Agreement.
15. Recognizing that the Pollution from Land Use Activities Reference Group (PLJARG) study and report conducted under the auspices of the International Joint Commission was a landmark in the understanding of the role of nonpoint or diffuse pollution in North America and that it has served as a strong base for the development of new strategies to cope with



Dr. R.L. Thomas

this problem, it is proposed that a similar study be undertaken for toxics. Therefore, it is recommended that the governments of Canada and the United States request the International Joint Commission to undertake a major study on an integrated approach to the management of toxic contaminants. The participation of the Great Lakes Fishery Commission in this study is encouraged.

Sources, Fate and Controls of Toxic Contaminants:

There are over seven million known chemical compounds, 30,000 of which are in substantial commercial use; approximately 1,000 new chemicals are developed each year. Over 1,000 chemicals are suspected carcinogens. Some of these chemicals occur naturally, which further illustrates the problem – manufactured chemicals are not the only source of toxic substances.

Sources:

1. There is a need to more effectively manage and regulate toxic substances on a global perspective. This approach must include developing nations. International efforts must utilize scientifically valid techniques for the collection of compatible data. The data thus developed should be shared by nations so that a global response to the toxic exposure problem may be developed.
2. Quantitative and qualitative source information needs to be enhanced to provide adequate information for establishing mass balances as a means of establishing causes and consequences. Sources include industries, municipalities, combined sewer overflows, agricultural and urban runoff, pollutants that are in-place in sediment, contaminated groundwater, etc.
3. Mediation of environmental impact (e.g., toxicity and bioavailability) of in-place pollutants is needed.
4. It is recommended that developing nations be encouraged to use alternative approaches to persistent organochlorine compounds (e.g., DDT, toxaphene) to obviate the buildup of these compounds in large lake systems. Emerging techniques in agriculture and pest control should be made available to developing nations as soon as possible.

Fate:

There is a need for a process/mechanism oriented, multidisciplinary, multinational,

coordinated effort to understand the fate, transport and effects of toxic substances in large lakes. Needed is a well-coordinated study of combining the scientific expertise of participant nations to address the urgent unanswered questions with regard to transport, fate and effects of toxic substances in large lakes ecosystems. This study should be a carefully coordinated, long-term (5-7 year) program designed to assess the major mechanisms of transboundary distribution and dissemination of contaminants.

Controls:

A menu of strategies and techniques for the control of toxic substance release to the environment is available. They range from waste reduction at the source, to treatment, destruction and disposal. These strategies and techniques should be extended to developing nations.

1. Waste Reduction On-Site or Near Source: It is recommended that control be emphasized at or near the source through reuse, recycle, recovery and waste exchange.
2. Waste Treatment, Destruction and Disposal On-Site or Near Source: It is recommended that:
 - a. hazardous waste management begin immediately.
 - b. an integrated approach to toxic substance control consisting of combinations of biological, physical, chemical and high-temperature thermal unit processes be implemented, recognizing opportunities for adding to existing in-place technology.
 - c. centralized hazardous waste treatment facilities for the small to medium sized generators be utilized.
 - d. innovative sludge management approaches and techniques be implemented.
 - e. existing or newly developed, low-cost, rapid screening techniques (e.g., bioassays) for assessing toxicity be used so that appropriate technical responses can be implemented before environmental damage occurs.
 - f. increased use of available process selection protocols for identification of the most cost-effective processes be implemented.
 - g. improved operation of existing hazardous waste treatment facilities which ensure that toxic compounds are not created (dioxins through incineration) be implemented. The importance of adequate operator training programs must be recognized and addressed.
 - h. effective technology transfer and continuing education be carried out in both developed and developing nations.

For more information on the conference and a complete copy of the summary and recommendations, contact Sue Henry, Public Affairs Division, Michigan Department of Natural Resources, P.O. Box 30028, Lansing, Michigan 48909; (517) 373-1214.

EVENTS

INTERNATIONAL JOINT COMMISSION
Schedule of Meetings

The following includes upcoming meetings scheduled by the Commission and its various boards. Some meetings may not be open to the public; please contact an IJC office for further information.

- July 9-10 – Water Quality Programs Committee
Chicago, Illinois
- 22-24 – IJC Public Information Committee Meeting and Executive Meeting, as needed
Toledo, Ohio
- September 9-11 – IJC Executive Meeting
Washington, DC
- 17 – Lake Ontario Task Force
Toronto, Ontario
- 24-26 – Science Advisory Board
St. Regis, Quebec/Ontario/New York
- October 7-8 – Aquatic Ecosystem Objectives Committee
Windsor, Ontario
- 7-9 – IJC Semi-Annual Meeting
Ottawa, Ontario
- 13-14 – St. Croix Briefing
St. Andrews, New Brunswick
- 17 – Science Advisory Board Executive Meeting
Windsor, Ontario
- 22 – Niagara and St. Lawrence Rivers Task Force
Kingston, Ontario
- 29-31 – IJC Workshop: Estimation of Atmospheric Loadings of Toxic Chemicals to the Great Lakes Basin
Scarborough, Ontario

The Fourth Annual Conference of the National Marine Education Association will be held August 4-9, 1986 at the John Carroll University, Cleveland, Ohio. Hosted this year by the Consortium of Aquatic and Marine Educators of Ohio (CAMEO) and the Ohio Sea Grant Education Program, the conference is entitled "These Magnificent Sweetwater Seas – The Great Lakes." Teachers, museum educators, scientists, administrators, and industry and government representatives are invited to participate in a wide variety of workshops, sessions, field trips and a Great Lakes symposium. For further information contact Rosanne W. Fortner at the Ohio Sea Grant Education Program, The Ohio State University, 059 Ramseyer Hall, Columbus, Ohio 43210, (614) 422-1078.

"Environmental Education: Transition to an Information Age" is the theme for the Annual Conference of the North American Association for Environmental Education to be held September 11-17, 1986 at the University of Oregon, Eugene campus. NAAEE members, including educators at all school levels and in government agencies and environmental organizations, will focus on the educational implications of the "information age" technologies through workshops, papers, speakers and other programs. Fairs and exhibits featuring curriculum/resource, film and publishers sources and field trips will also be included.

If you'd like to attend, contact NAAEE Headquarters, P.O. Box 400, Troy, Ohio 45373, (513) 698-6493.

The National Water Well Association is sponsoring two events in September. A short course on Containing and Controlling Groundwater Contamination is scheduled for September 8-10, 1986 in Orlando, Florida, and the National Water Well Exposition will be presented September 22-24 in Kansas City, Missouri. For more information contact Lisa Ammerman or Paula Williams NWWA, 6375 Riverside Drive, Dublin, Ohio 43017, (614) 761-1711.

The Fourth Annual National Waterfront Conference, "Urban Waterfronts '86: Developing Diversity," will be held September 25-27, 1986 at the Ramada Renaissance Hotel, Washington, DC. The program includes three concurrent tracks of panel sessions organized according to theme, along with major opening and closing addresses. Attendees are expected from private development firms, city governments, architectural and planning firms, universities, citizen's organizations and public interest groups. The conference is cosponsored by 15 companies, cities and universities and The Waterfront Center, a nonprofit research and consulting corporation. For more information contact the Center at 1536 44th Street NW, Washington, DC 20007, (202) 337-0356.

On October 1-3, 1986, the Great Lakes Commission will hold its Annual Meeting at the Holiday Inn in Duluth, Minnesota. Presentations and workshops are now being scheduled, and all interested persons are welcome to attend. For further information contact Dr. James Fish, Executive Director, Great Lakes Commission, 2200 Bonisteel Boulevard, Ann Arbor, Michigan 48109, (313) 665-9135.

Experts Consider the Human Factor in Great Lakes Pollution

by John McDonald

On April 14, experts from all over North America met at the International Joint Commission (IJC) Great Lakes Regional office, Windsor, to consider the "human factor" in Great Lakes pollution. Drawing on their expertise in labour relations, manufacturing, environmental and workplace regulation, the nuclear utility, aviation and academe, the participants outlined a number of important factors in the battle against Great Lakes contamination.

A Higher Priority

Workshop participants agreed that the human factor is often treated as an afterthought in the design and operation of facilities. An example of this point involved a maintenance worker who routinely cleaned a valve on an oil drilling platform in the North Sea. One day after cleaning the valve, he replaced it in a reversed position. The resulting petroleum leak ignited, causing several million dollars worth of damage. On review, the fault was assigned not to the worker, but to the design engineer who had failed to create a design that would make such a reversal impossible.

In addition to more practical education for engineers and other scientists in this field, involving human factors personnel directly in the design and operation of any facility was considered essential for the continued consideration of the human element.

Better Training and Communications

As "high tech" invades the workplace, the need for better training, education, reporting and data collection is increasingly evident. All too often, organizations succumb to the belief that anyone can learn to do anything, frequently by allowing on-the-job training or "learning by doing." "Training" should mean a thorough grounding in the specifics of a particular activity and a communication of

the broader impacts of such activity. A more effective approach advocated by the workshop's participants included a proper amount of training by experienced personnel who have demonstrated teaching skills and development of a clear and concise manual prepared in cooperation with its users.

A proper attitude within an organization was emphasized. The success of the "Smokey the Bear" campaign was noted, as was the relative failure of voluntary seatbelt efforts. The message and the priority for control programs should be endorsed and disseminated from the top of the organization. The link among lax operations, poor maintenance, poor public relations, elevated risks and incidents is repeatedly evident.

A positive environment and effective communication or feedback are essential to the science of human engineering. Process operators, maintenance workers and other employees involved in the manufacturing process should be offered anonymity to encourage responses. Data should be collected on both the significant accidents and incidents that could have been significant. The data collection methodology should be designed to ensure that it is clear and relevant to as many applications as possible.

Implications for the Regulatory Agency

Jurisdictions should foster an environment where those who are regulated can respond positively. Some people advocated self-regulation with the threat of significant financial loss in case of failure. Public involvement was seen as an important part of any regulatory activity; the regulatory method, the rationale for it and the confidence level associated with it should be clearly and repeatedly presented to the public so they are aware of the goals and techniques being used by the agencies to control pollution.

A detailed record and conclusions of the workshop are now before the Great Lakes Science Advisory Board. Should the SAB concur, future discussions will attempt to include more participants from the industrial and municipal dischargers in the basin to enhance the possible usage of the findings.

IJC Holds Its Semi-Annual Meeting

by Sally Cole-Misch

The spring semi-annual meeting of the International Joint Commission was held in Washington, DC April 15-17, 1986 at the Department of State. The meeting provides an opportunity for commissioners to meet personally with advisors and board members to discuss issues surrounding the boundary waters. Reports were received from boards representing the Great Lakes, the International Air Quality Advisory Board, and the St. Croix, Red and Rainy Rivers.

After an executive session Tuesday morning, the Commission met with representatives from the Great Lakes Water Quality and Science Advisory Boards to discuss their progress reports. The Water Quality Board stressed that pesticides and toxic substances are the

major concerns in the basin. The International Advisory Board on Control of Water Pollution – St. Croix River discussed its report with the Commission late Tuesday afternoon and outlined their plans for a workshop on possible uses of the river to be held September 8-9, 1986.

One highlight of the meeting was a reception at the State Department Tuesday evening hosted by the US section for the Commission, its staff, advisors, board members and guests. The reception was held in the recently remodeled Thomas Jefferson room, where several antique pieces of furniture and elaborate chandeliers added to the festivity of the evening. A brief presentation ceremony was held before the reception by the Commissioners to thank their staff at the three offices in Washington, DC, Ottawa and Windsor and the board chairs and co-chairs.



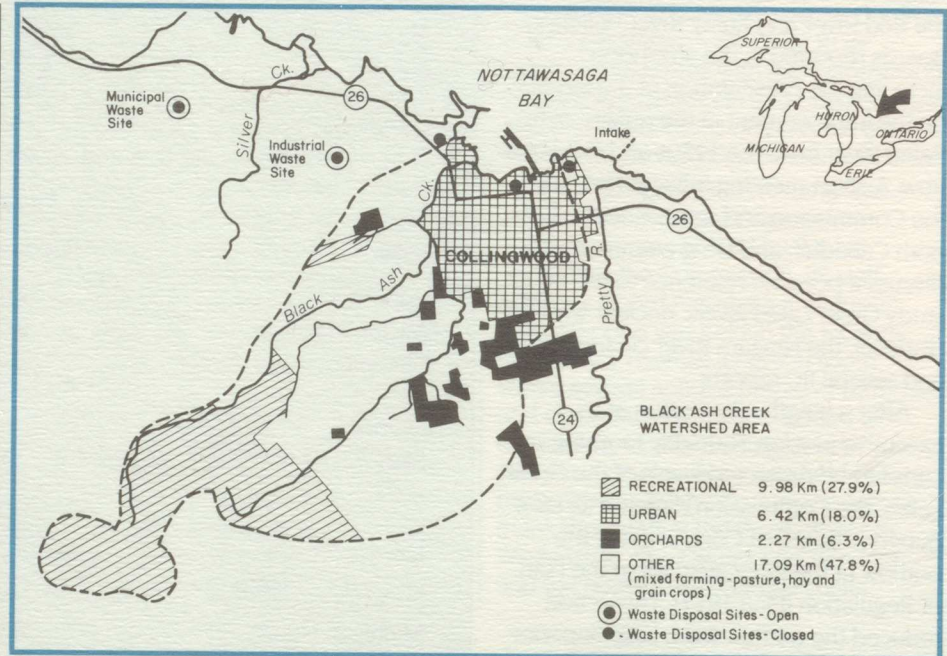
Preparation of a Remedial Action Plan For Collingwood Harbour Area of Concern

by John Hartig

This is the second in a series of articles highlighting the development of remedial action plans for restoring beneficial uses in Areas of Concern in the Great Lakes Basin.

Collingwood Harbour is located on the southern shore of Georgian Bay in northeastern Lake Huron. The adjacent town of Collingwood has a population of 11,700 people. Collingwood Harbour receives tributary drainage from two storm canals and one small creek (which receive agricultural runoff and stormwater drainage), effluent from a 5.4 million gallon per day sewage treatment plant (which receives industrial wastewater) and runoff from a shipyard and the town of Collingwood. In 1977 Collingwood Harbour was identified as a "problem area" (now called an Area of Concern) due to nuisance algae and elevated bacterial levels. A remedial program to expand and upgrade the existing Collingwood sewage treatment plant to activated sludge, secondary treatment with phosphorus removal was completed in 1982.

Like many of the Areas of Concern in the Great Lakes Basin, Collingwood Harbour was first recognized as a cultural eutrophication problem (i.e. growth in nuisance algae and depletion of dissolved oxygen). However, in 1981 surficial sediments in the harbour were reported to exceed Ontario guidelines for open-water disposal of dredged sediments due to elevated levels of PCBs, lead and zinc. Contamination of sediments is primarily due to historic use of the harbour as a waste receiver and as a centre for repair and construction of Great Lakes vessels. A shift in concern



from cultural eutrophication to toxic substances is typical of most Areas of Concern and reflects our progression of scientific understanding of the Great Lakes ecosystem.

As part of the Great Lakes Water Quality Board's initiative on Areas of Concern, Collingwood Harbour and St. Louis Bay (in Lake Superior) were singled out to receive special effort to develop remedial action plans as part of a learning process. These remedial action plans would then serve as models for the remaining areas. A working committee was formed by Ontario Ministry of the Environment to initiate development of a remedial action plan based on the available data and information. The committee included representatives from Ontario Ministry of the Environment and Environment Canada and received assistance from the International Joint Commission. A draft plan was recently completed and is being reviewed by

the Water Quality Board. The review will serve as a basis for revising the Collingwood Harbour remedial action plan in order to assure that it precisely identifies all actions necessary to control existing sources of pollution, abate existing environmental contamination and restore all beneficial uses.

In addition to the remedial measures already implemented, the draft remedial action plan for Collingwood Harbour has identified that dredging of the turning basin is planned for the summer of 1986. The dredged sediments will be placed in a confined disposal facility to be built within the harbour. However, the plan also identifies the need to perform studies in 1986-87 to: investigate the effectiveness of the upgraded sewage treatment plant; assess toxicity and bioavailability of in-place pollutants; quantify contaminant loadings from shipyard runoff, storm sewers and the small creeks; investigate sediment

transport concerns; and assess potential for fisheries habitat. The estimated cost for development of the draft remedial action plan and the 1986-87 studies is \$500,000. Following completion of the dredging project and additional studies and receipt of the Water Quality Board review of the draft plan, Ontario Ministry of the Environment will revise the Collingwood Harbour remedial action plan, including identification of the need, if any, for additional remedial measures. The remedial action plan is scheduled for completion by March 1987.

A public involvement program is also identified in the remedial action plan to provide the town of Collingwood, Simcoe County and other interested parties an opportunity to comment and provide input to development of the final remedial action plan. This information-feedback program will identify and resolve conflicting uses of the area, identify concerns related to environmental quality and determine future plans for the area.

For further information contact Katharine J. Simpson at Ontario Ministry of the Environment, 135 St. Clair Avenue West, Toronto, Ontario M4V 1P5. (416) 965-4590.



MICHIGAN, ONTARIO AND INDIANA PLAN PUBLIC MEETINGS ON AREAS OF CONCERN

Fourteen Areas of Concern have been identified in Michigan. A remedial action plan must be developed and carried out in each of these areas where the IJC has determined that severe Great Lakes pollution exists. The state has set a goal of preparing these plans by August 1987, each of which will be reviewed by the Great Lakes Water Quality Board.

Michigan's Office of the Great Lakes (OGL) has scheduled public meetings to ensure that citizens' ideas and suggestions are included in the preparation and implementation of the remedial action plans. Status reports on the developing plans will be presented at each meeting, and an ongoing dialog with citizens and local governments hopefully will be established that will continue throughout each plan's development and implementation.

Public meetings for four of the Areas of Concern have already been held (Deer Lake/Carp River, Kalamazoo River, White Lake and the Raisin River). Meetings still scheduled include:

Clinton River	- Thursday, July 17 - 7:00 pm
Torch Lake	- Tuesday, July 29 - 7:00 pm
Muskegon Lake	- Thursday, August 21 - 7:00 pm
Manistique River	- Tuesday, September 2 - 7:00 pm
Saginaw River/Bay	- Tuesday, September 16 - 7:00 pm
Detroit River	- Thursday, October 9 - 7:00 pm

Public meetings have not been scheduled by Michigan for the St. Clair and St. Mary's Rivers where the Ontario Ministry of the Environment is developing the public hearings and remedial action plans, nor for the Menominee River (where Wisconsin has responsibility) or the Rouge River, where a great deal of public involvement already exists.

For further information on meetings and locations, contact OGL Director Tom Martin or Karen Gottlieb, Office of the Great Lakes, Michigan Department of Natural Resources, P.O. Box 30028, Lansing, Michigan 48909. (517) 373-3588.

A similar public hearing was held June 5, 1986 by the US EPA Region V office, Chicago, and the Indiana Department of Environmental Management to discuss a jointly proposed Environmental Action Plan for northwest Indiana. This plan expands on the existing Grand Calumet remedial action plan to coordinate efforts in addressing air, water and land pollution problems in the industrialized northwest region of the state. For information on the results of the hearing contact Doug Ehorn, US EPA Region V Office, 230 S. Dearborn, Chicago, Illinois 60604. (312) 353-2154.

The Ontario Ministry of the Environment and Environment Canada have also scheduled a public hearing to discuss future remedial actions planned for the Hamilton Harbour. Both departments are developing a schedule for overall remedial proposals to be developed by the end of this year that will take all affected parties into consideration. The meeting is scheduled for July 16, 1986, at the Hamilton Convention Centre, Albion Room, 115 King Street West, Hamilton, Ontario, from 7:30 - 10:30 p.m. For more information contact Sally Leppard, Hamilton Harbour Project, 208 Bloor Street West, Suite 603, Toronto, Ontario M5S 1T8. (416) 926-8121.

Governors Sign Agreement to Control Toxics in the Great Lakes

by Sally Cole-Misch

The governors of the eight Great Lakes states have approved a Toxic Substances Control Agreement as a first step in the development of a more comprehensive plan for control of toxics into the lakes. Four governors – James Thompson of Illinois, Richard Celeste of Ohio, Anthony Earl of Wisconsin and James Blanchard of Michigan – signed the agreement during a meeting of the Council of Great Lakes Governors May 21 on Mackinac Island, Michigan. It was signed earlier by the governors of New York, Pennsylvania, Indiana and Minnesota.

Ontario and Quebec officials voiced support for the agreement and plan to develop a similar accord by October 1, 1986. Because the agreement follows state and US federal laws, only the eight Great Lakes states could sign the agreement.

The agreement is the product of a task force developed by the Council in December 1985 to develop a coordinated and effective strategy between the states' governments to reduce lake pollution. It is the third agreement among the states on Great Lakes issues, following the Great Lakes Charter and a ban on oil drilling.

Six major principles are outlined in the agreement: a recognition that management of the Great Lakes should be based on the economic and environmental

importance of the resource to the region; a commitment to manage the Great Lakes as an integrated ecosystem; agreement that persistent toxic substances are the foremost environmental issue confronting the basin; a renewed commitment to reduce toxics in the Great Lakes to the maximum extent possible, in keeping with the Federal Clean Water Act's goal of prohibiting discharges in toxic amounts and the Great Lakes Water Quality Agreement's aim to virtually eliminate toxic discharges; increased cooperation among states and with local, regional and federal groups and agencies and the IJC in studying, monitoring and managing the water resources in the basin, and an agreement to work cooperatively to improve the region's information retrieval and technical analysis capabilities.

In particular, the governors agreed to several specific actions:

- No reduction or lowering of pollution control standards to encourage economic development in any individual state.
- Develop a coordinated control plan for toxic discharges by September 1, 1986 which strives to create greater uniformity of regulations within the basin.

- Establish an overall plan to encourage the reduction, recycling and safe treatment of hazardous wastes, with specific recommendations by January 31, 1987.
- Notify other states of accidental discharges of toxic pollutants into the air and water.
- Standardize procedures for listing fish to provide common advisories on the hazards of eating polluted fish by the 1987 fishing season.
- Consider the effects of airborne pollutants on human health and aquatic life when setting air emission standards.
- Standardize methods to identify toxic effects of pollution on wildlife and on human health.
- Urge public involvement in the cleanup of the Great Lakes through public forums and increased emphasis on environmental awareness in the educational curriculum.
- Review progress annually in accomplishing tasks outlined in the agreement.

For more information contact Karyn Severson, Executive Director, Council of Great Lakes Governors, 310 South Michigan Avenue, Tenth Floor, Chicago, Illinois 60604. (312) 427-0092.

BRIEFS

Canadian Environment Minister Thomas McMillan and US EPA Administrator Lee Thomas signed an agreement in May to clean up the Niagara River of toxic chemicals flowing into it and into Lake Ontario, mainly from underground dumps. The statement of intent generally outlines the desire of both governments "to establish goals for the reduction of toxic loadings" flowing into the river, suggesting the

possibility of lowering emissions of certain toxic chemicals by 50 percent by 1995, "taking into account applicable water quality and drinking water standards." Ontario has stressed excavation of toxic waste sites, and while it is not ruled out in the statement, a method in which leaking wastes would be sucked back into the sites, contained with barriers and monitored is emphasized instead. The

statement is expected to lead to a final agreement by July 1987 that will set goals for significantly reducing toxic discharges into the Niagara River.

The Canada-Ontario Agreement Respecting Great Lakes Water Quality, first signed in 1971, was renewed in March 1986 by Federal Environment Minister Tom McMillan and Ontario Environment Min-

ister Jim Bradley. The new six-year agreement provides for each government to contribute \$9.6 million for pollution surveillance programs and \$1.4 million for phosphorus control. The federal government will also transfer \$9.7 million to Ontario and area municipalities to upgrade or build new sewage treatment facilities, while the province will contribute \$14.2 million and the municipalities \$25.2 million for the same task.

As a part of the Canada-Ontario Agreement, a five-year Soil and Water Environmental Enhancement Program (SWEEP) has been agreed to by Canadian Federal Agriculture Minister John Wise and Ontario Minister of Agriculture and Food Jack Riddell. The goal of the \$30 million agreement is to reduce phosphorus loadings in Lake Erie basin from agricultural runoff by 200 tonnes per year by 1990, through better soil management and cropping practices in southwestern Ontario. The SWEEP program was developed to comply with an October 1983 amendment on phosphorus load reduction to the 1978 Great Lakes Water Quality Agreement to reduce phosphorus levels entering Lake Erie by 300 tonnes per year from the Canadian side of the basin. The remaining 100 tonnes will be reduced from Canadian municipal and industrial sources. The US goal for a loading reduction in phosphorus is 1700 tons per year, as also set out in the 1983 Amendment to the Agreement. The US plan is now in the final stages of review.

Levels of polychlorinated biphenyls (PCBs) are declining in Lake Superior according to Steven Eisenreich, University of Minnesota professor of environmental engineering. Supported through funding from the Minnesota Sea Grant College Program, Eisenreich has compiled 10 years of data which show that as levels of PCBs decline in the atmosphere, levels also decrease in the lake. He has found that Lake Superior efficiently reduces the level of PCBs within three years after the chemical enters the lake, either

through settling into bottom sediments or volatilizing back into the atmosphere. Because the source of PCBs in Lake Superior is almost exclusively atmospheric, declines may be faster than in other Great Lakes where heavier pollutant inputs from rivers and industrial sources have occurred.

For more information contact the Minnesota Sea Grant College Program, 116 Classroom-Office Building, University of Minnesota, 1994 Buford Avenue, St. Paul, Minnesota 55108. (612) 373-1708.

Because of expanding IJC interests and potential activities related to toxic air pollutants, Commissioner L. Keith Bulen and US Section office Scientific Advisor Dr. Joel L. Fisher attended the recent Air Pollution Control Association/US Environmental Protection Agency Symposium on Monitoring Toxic Air Pollutants in Raleigh, North Carolina April 28-30, 1986. The symposium included sessions on methods of sampling, measurement, advances in instrumentation, intercalibration and quality control studies, and analysis of air samples for trace quantities (parts per billion or less) of toxic organic compounds and inorganic compounds and ions. In addition, the two IJC attendees visited the nearby US EPA Laboratory at Research Triangle Park, North Carolina where laboratory research in air pollution and related aspects of human health is carried out. Noteworthy was the prototype instrument station for the NAPAC (acid rain) deposition network. The prototype housing contains instrumentation being tested for the NAPAC deposition network along with various telemetry and remote control data access systems and microcomputers to manage complex instrument packages as self-sustained field operations. Similar housings with tested instrumentation and control systems will be installed at various field installations during the next several years as part of the NAPAC program.

Also noteworthy was the latest on-line gas chromatograph/mass spectrometer

(GC/MS) system with digital computer spectral matching for automated analysis of air samples for trace organic compounds. Two air samples, from Chicago and Houston, were being analyzed at the time of the visit for some 300 toxic organic chemicals of research interest and 85 chemicals for regulatory and control interest. Among the latter 85 chemicals are various members of the dioxin and dibenzofuran families.

Environment Canada has signed an agreement with Newfoundland that provides for water sampling from 46 stations to be tested at the Canada Centre for Inland Waters laboratory in Burlington, Ontario. Funding for the first year of the project comes from the federal department (\$127,000) and from the province (\$185,000). The ultimate goal of the program is to establish a national network that will provide a daily measure of the quality of Canada's freshwater resources. Similar agreements were signed with Quebec in 1984 and British Columbia in 1985.

At their Annual Meeting in May, Great Lakes United members passed 18 resolutions concerned with air quality, water quality, hazardous waste, diversion of Great Lakes water, fish and wildlife habitat, land use and energy. Executive Director David Miller focussed on these resolutions as the best way for the coalition of 170 organizations to set an agenda for action over the following year.

Conference participants listened to a panel discussion on toxics in the Great Lakes and took part in small-group workshops on various issues surrounding the lakes, including research, in-place pollutants and a review of the status of the Great Lakes Water Quality Agreement. IJC Regional Office Director Rich Thomas and Staff Biologist Trefor Reynoldson and Environmental Advisor Andy Hamilton, IJC Ottawa, served as speakers in three of the workshops.

A listing of the Citizen Hearings on

Great Lakes Water Pollution (see FOCUS, Volume 11, Issue 1, p 11) was also distributed at the meeting. Nineteen public hearings are scheduled in the following locations:

- July 10 – Milwaukee, WI
- July 14 – Green Bay, WI
- July 17 – Duluth, MN
- August 5 – Marquette, MI
- August 7 – Sault Ste. Marie, MI
- August 19 – Kingston, ON
- August 21 – Cornwall, ON
- September 8 – Montreal, PQ
- September 16 – Chicago, IL
- September 18 – Gary, IN
- September 22 – Grand Rapids, MI
- September 25 – Auburn, MI
- October 7 – Windsor, ON
- October 9 – Sarnia, ON
- October 14 – Toledo, OH
- October 16 – Cleveland, OH
- October 21 – Erie, PA
- October 23 – Toronto, ON
- October 30 – Buffalo, NY

For times and locations of the hearings and further information on the Annual Meeting, contact Tim Eder, Field Coordinator, Great Lakes United, 24 Agassiz Circle, Buffalo, New York 14214. (716) 886-0142.

The International Association for Great Lakes Research (IAGLR) held its 29th Annual Conference May 16-29, 1986 at the University of Toronto in Scarborough, Ontario. The conclusions and recommendations of the World Large Lakes Conference on Mackinac Island, Michigan were presented during the keynote session, followed by concurrent sessions on the human impact of toxic chemicals, water balance and circulation, coastal sedimentation, biology and ecology of fish and other limnological subjects. The Association also held a general meeting during the conference in which resolutions were passed concerning several areas of Great Lakes research. Look for a complete report on the conference in the next issue of FOCUS.

Focus on the IJC

The International Joint Commission's (IJC) responsibilities under the 1978 Great Lakes Water Quality Agreement is supported primarily by staff in the Great Lakes Regional Office. To support the work of the Commission under the Boundary Waters Treaty of 1909 and governmental references pursuant thereto, the IJC maintains a small staff in Washington, DC and in Ottawa, Ontario. All work from the US Commissioners, Chairman **Robert McEwen** and Commissioners **L. Keith Bulen** and **Donald Totten**, comes out of the US section office. In this month's Focus on the IJC, we introduce you to the staff in our Washington, DC office.

As Secretary to the US Section of the Commission, **David LaRoche** is primarily responsible for the overall operation of the Washington, DC office, coordinating activities with the Ottawa office and supervising the execution of Commission decisions. He grew up in New Hampshire, earned a B.S. degree from Boston University in 1966 and a Master's degree in Education in 1975 from Harvard University. Before he joined the Commission in 1979, David worked as Administrative Assistant to US Senator Thomas McIntyre.

Bruce Bandurski serves as Ecomanagement Advisor to the Commission. His position involves developing the concept of an integrated transboundary monitoring network, along with other tasks like finalizing the proceedings from the Commission's Transboundary Monitoring Network Workshop. Bruce worked in the Public Health Service and several planning and environmental management positions in the US Department of the Interior before coming to work for the IJC in 1983. He graduated in 1962 with a B.S. degree from the Honors College of Michigan State University.

Jim Chandler serves as the "institu-

tional memory" for the Washington, DC office, since he's worked for the Commission as a Legal Advisor since 1973. Jim focusses on reviewing, writing and advising on orders of approval and other relevant documents that come to the attention of the US section of the Commission. He enjoys travelling, biking and playing the guitar, and earned his law degree from George Washington University Law School in 1972, a Master's from University of Kentucky in 1968 and a bachelor's degree from Duke University in 1967. Jim has also worked as a legal assistant at the US Environmental Protection Agency.

The only person who's worked at the Washington DC office longer than Jim is Administrative Officer **Louise Cox**, who joined the Commission's staff in 1960. Louise is responsible for preparing the US Section office's budget, handling all financial operations, maintaining the personnel files and serving as security officer. She has worked for the government since 1957 and spends a lot of her time coordinating records and other matters between her office and the State Department's administrative offices.

As the Senior Scientific Advisor to the Commission, **Joel Fisher** is responsible for assessing the scientific validity of reports to the IJC and recommending what additional research would be beneficial. Before he joined the IJC staff in 1980, he held research appointments in the US Environmental Protection Agency, the Federal Water Quality Administration, the Federal Water Pollution Control Administration and the Department of Defense. Joel holds degrees from Cooper Union Institute, New York (BChE.), Vanderbilt University (M.S.) and the University of Pennsylvania (Ph.D.).

Rita Kerner's job as Assistant Secretary keeps her busy in just about every part of the US office's activities. She is primarily responsible for assist-

ing David LaRoche and the Commissioners by reviewing all mail to and from the Commission, attending and taking the minutes at all Executive and other Commission meetings and helping to plan and organize meetings held by the US Section office. Rita also serves as the administrative liaison to the Commission's boards and committees that do not deal with Great Lakes water quality and tries to keep the office staff updated on current activities of interest to the IJC.

If another staff member has a question about security or accounting, they come to **Beverly O'Rourke**. As Administrative Assistant, she is responsible for the IJC Accounting program, procurement and security/safety of the office and its materials. Bev enjoys travelling, reading, golf and tennis in her free time.

Engineer Advisor **Donald Parsons** serves as the Commission's liaison to its Boards of Control, including the three Boards involved with Great Lakes levels regulation. He also advises on all engineering matters that come to the Commission and has been especially busy recently with issues surrounding the Great Lakes due to the high water levels. Don received his B.S./CE degree in 1955 from Virginia Military Institute, a Master's/CE degree from Auburn University in 1965, and has worked at the US Water Resources Council, Department of Commerce and Army Corps of Engineers.

Lucy Slaughter works as a secretary to Don, Jim and Sally Spiers. Her job includes typing orders, legal papers and press releases, maintaining a news clipping file for the office and the Commissioners, making travel arrangements and preparing material for meetings. She attended Tougaloo Southern Christian College and recently enjoyed the excitement her family experienced when her nephew

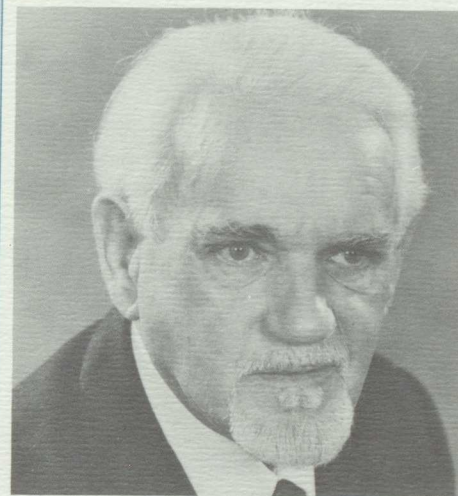
was drafted as a wide receiver for the Cleveland Browns.

Public Affairs Director **Sally Spiers** serves as the principal liaison to the media and other groups for the Commission. As part of this responsibility, she makes all arrangements for the IJC's public meetings in the US. Before she joined the Commission's staff in 1983, Sally worked as Congressional Liaison Officer at the US Department of Housing and Urban Development and Deputy Administrative Assistant to US Senator Richard Lugar. Politics is her major interest, although she claims to be a "basketball fanatic." Sally graduated with departmental honors in mathematics from Indiana University in 1970.

Shelia Tibbs is the newest addition to the Washington, DC staff. She started working for the IJC in April and will be handling duties as a secretarial assistant for Rita. Shelia is also attending Montgomery College, majoring in computer operations, and actively volunteers her time to a retirement home in the area.

As a secretary for Joel and Bruce, much of **Barbara Wolk's** time is spent researching articles and other documents for items of interest to the Commission. Before joining the US section office, she worked as a collaborative program clerk for an oncologist with the National Institute of Health, personal assistant for a judge at the OSHA Review Commission and head secretary to the general counsel at the Consumer Product Safety Commission. Bobbi attended Montgomery College, and has decided the perfect life if she ever retired would be a house on the beach with five dogs.

PEOPLE

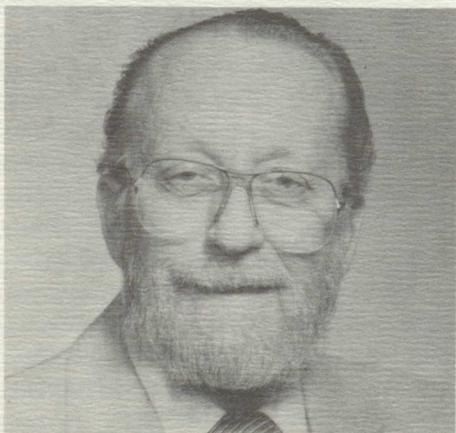


As the scientist and researcher whose work on eutrophication served as one of the catalysts for the creation of 1972 Great Lakes Water Quality Agreement, Dr. Richard Vollenweider has played a key role in the restoration of the Great Lakes and other lakes around the world. His work was honored in May when he won the Tyler Prize – considered the Nobel Prize of environmental studies. Dr. Vollenweider, senior scientist in Environment Canada's National Water Research Institute at the Canada Centre for Inland Waters in Burlington, Ontario, helped to find the solution to the eutrophication problem with a milestone scientific report published in 1968. He developed the report while he was a full-time consultant to the Organization for Economic Cooperation and Development in Paris, and it showed that the Great Lakes and other bodies of fresh water were being choked by overfertilization, producing excessive algae and other vegetation, from runoff of phosphorus and other nutrients. His mathematical model showing how much phosphorus a lake can tolerate was initially criticized by the scientific community, but proved to be accurate and has been used to reverse the eutrophication of dozens of lakes worldwide.

Dr. Vollenweider shares the Tyler Prize with another Swiss-born scientist, chemist Werner Stumm. The prize was established in 1973 by Alice C. and John C. Tyler. The two scientists each receive a gold medallion and \$75,000 for their research into water pollution and control. A reception to honor Dr. Vollenweider was held by Environment Canada at the World Large Lakes Conference on Mackinac Island, Michigan. A plaque also was presented to him during a keynote address at the conference by Russell E. Train, Chairman of the Board for the World Wildlife Fund.

The talents of Information Officer Jean Laforge will be missing from the Regional office and the July and November issues of Focus. Jean has taken a six-month leave of absence to venture into new areas of interest. We look forward to her return in early November.

Robert E. White, senior scientist at the IJC Regional Office in Windsor, has received an Award of Merit and was titled a Fellow of the Society by the American Society for Testing and Materials (ASTM). The award is given for his distinguished service to the cause of voluntary standardization and his 16 years of dedication and contributions to the Society.



Upper Connecting Channels Study Identifies Sources of Pollutants

by Trefor B. Reynoldson

The St. Marys, St. Clair and Detroit Rivers as well as Lake St. Clair constitute the Upper Great Lakes Connecting Channels, each of which have been designated as an Area of Concern by the International Joint Commission (IJC). Pollution problems have been identified in these systems since the 1940s and concerns have included bacterial contamination, phenol problems, high levels of iron, mercury and phosphorus. Some of these problems have been completely or partially rectified. However, major attention now is focussed on toxic substances which have been detected in water, sediment and biota through the Upper Connecting Channels system.

In November 1983, in response to the concerns expressed through the IJC to the Governments of Canada and the United States about the quality of the Upper Connecting Channels, U.S. EPA Administrator William Ruckelshaus first announced a three-year study on the system at the IJC Biennial meeting in Indianapolis, Indiana, and invited Canadian involvement. The joint Canada/U.S. Upper Connecting Channels Study (UGLCCS) was formally announced in July 1984 and a joint Canada/U.S. Management Committee was formed to oversee the planning, implementation and reporting of the study.

The objectives of the study are:

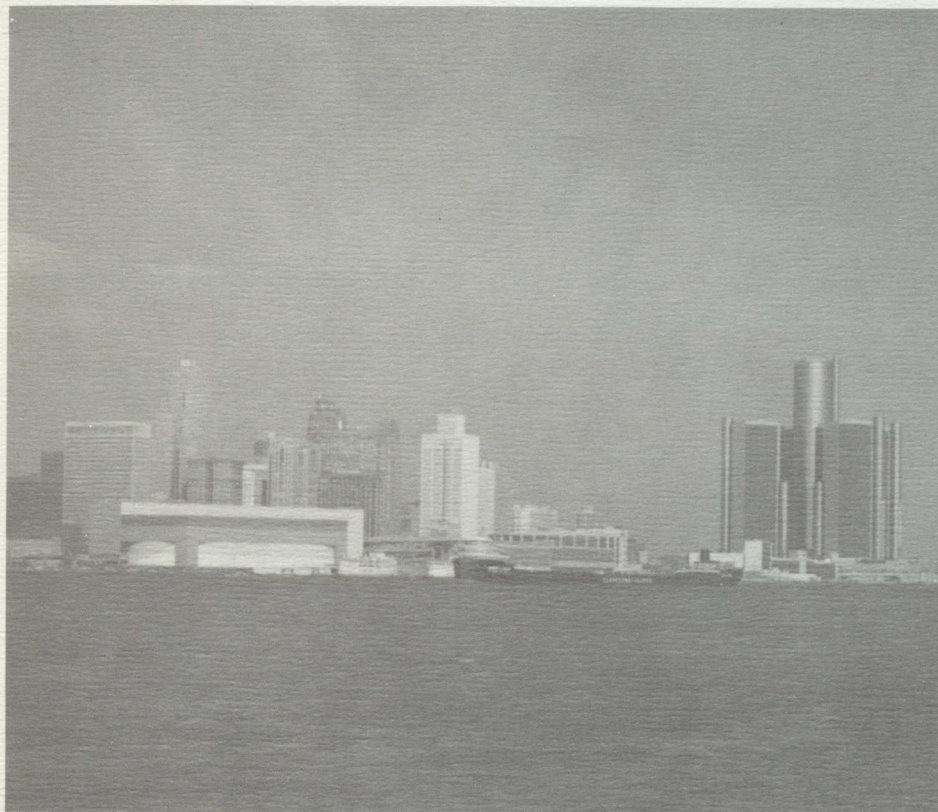
- A. To determine the existing environmental conditions of the St. Marys and St. Clair Rivers, Lake St. Clair, the Detroit River and its influx into the western basin of Lake Erie and to determine information gaps.
- B. To undertake additional studies as needed to: identify and quantify

impacts of conventional and toxic substances from point sources, nonpoint sources (including runoff and groundwater) and tributaries on beneficial human uses and plant and animal populations within the system; determine the adequacy of existing or proposed control programs to ensure or restore beneficial uses; and recommend appropriate control and surveillance programs to protect and monitor the waterways and lakes.

The approach taken for each of these broad objectives was that the study should have a regulatory management focus and that activities be designed to assess the need for further remedial actions and to facilitate the development of remedial action plans. Activities were to focus on the two broad areas of toxic substances and habitat destruction, and a mass balance modeling framework would be used that would be directed toward synthesizing and interpreting the data collected.

The first year of the study is completed and a report on activities is due for release. The 1986 field season is the next major effort of the study and the schedule calls for a final report to be submitted in late 1987.

Below is a brief synopsis of the findings of the first year of study, which summarizes the results of the 71 activities in the UGLCCS Work Plan of Activities and the approximately 150 individual projects within the activities. These projects relate to biota, sediment, water, point sources, nonpoint sources, modeling and quality assurance/quality control. The activities are being conducted by approximately 30 laboratories in the United States and Canada and include 12 cooperating government agencies in both countries.



St. Marys River

Contaminant loadings to the St. Marys River have impacted water quality, sediments and biota and polycyclic aromatic hydrocarbons (PAHs) have been identified as an emerging problem. The presence of PAHs in biota, sediment and Sault Ste. Marie drinking water supplies were substantiated. As a result, the surface water intake has been moved upstream of industrial and municipal discharges.

Sediments were further confirmed to be contaminated with heavy metals, oils and greases, phenolics, cyanides and polychlorinated biphenyls (PCBs). Impairment of the benthic community has been noted on the Canadian side of the river downstream of the municipal and industrial discharges in Sault Ste. Marie and in the immediate vicinity of Algoma Steel Corporation. Recent findings of chlorinated organics and mercury residues in spottail shiners indicate the presence of low levels of DDT congeners in the vicinity of Sault Ste. Marie. Ambient water quality of the St. Marys River has been impacted by discharges associated with the Algoma Steel mills, Abitibi paper mill, municipal sewage treatment plants and urban runoff. Phenolics and cyanides have been identified as contaminants of primary

concern. Investigation of the ambient water quality of the river and tributaries will continue in 1986 and data used for modeling will be gathered.

There is a paucity of historical data on point source inputs to the St. Marys River. An inventory and intensive sampling of discharges will be conducted in 1986. Moreover, preliminary analyses of the Algoma Steel slag dump have suggested PAH contamination of groundwater under and adjacent to the site, thereby prompting further investigations.

St. Clair River

Heavy industrial and urban development and use as a transportation corridor have contributed to the impairment of the quality of the St. Clair River and its designation by the IJC as an Area of Concern. The ambient water, sediments and biota have each been impacted by conventional pollutants, heavy metals and toxic organics.

Surficial sediments in the St. Clair River are contaminated with heavy metals, PCBs (up to 3,000 ug/kg), hexachlorobenzene [HCB] (up to 600 ug/kg), octachlorostyrene [OCS] (up to 580 ug/kg) as well as other organic contaminants. No tetrachlorodioxins or 2,3,7,8-tetrachlorodibenzo-p-dioxin [TCDD] were detected. Despite reductions in point source discharges in

areas historically impacted, a zone of severe impairment approximately 5 km (3 miles) long exists along the industrialized Sarnia waterfront and extends approximately 75 m (250 feet) out from the shoreline. Preliminary results from clam biomonitoring studies at 21 stations in the St. Clair River have indicated the presence of elevated chlorinated organics (PCBs, OCS, HCB, hexachlorobutadiene [HCB] and octachlorobenzene [OCB]) along the industrialized waterfront, with some residues detectable 35 km (22 miles) downstream. Emerald shiners collected from three locations in the St. Clair River in 1985 showed no detectable 2,3,7,8-TCDD but a level of 1,200 parts per trillion of total dibenzofurans.

Extensive ambient water quality sampling in 1985, for both the UGLCCS and sampling conducted during the Environment Canada/Ministry of Environment investigation of the Dow perchloroethylene spill and cleanup, identified conventional contaminants, heavy metals and toxic organics associated with point source discharges from industrial, municipal and agricultural drainage sources. Mapping of point sources has been completed and monitoring of combined sewer overflows (CSO's) and industrial and municipal point sources has been initiated. Investigations of the potential impacts of contaminated groundwater on the river are underway.

Lake St. Clair

Lake St. Clair is unique in the study area in that it has few direct point source discharges. For phosphorus, nonpoint agricultural sources appear to provide the major loadings. The lake may, however, be acting as a temporary sink for a number of contaminants contributed from upstream. Sediment mapping and core sampling performed in 1985 will provide information as to depositional areas and the significance of the lake as a sink or source of

contaminants. Preliminary analysis of data on radioisotopes suggest that parts of Lake St. Clair will serve as a reservoir of pollutants for years to come.

Detroit River

The impact of the St. Clair River and Detroit/Windsor metropolitan area discharges on sediments, biota and water quality in the Detroit River have contributed to its designation as an Area of Concern. Sediment data from historical studies have been mapped and tributary mouths have been sampled to characterize the toxic substances loading associated with incoming sediments. Bioassay of sediments indicates a potential toxicity gradient from Monguagon Creek, which flows into the Trenton Channel and into the Detroit River toward Lake Erie.

A mass balance is being prepared from data obtained in intensive surveys of head and mouth transects of the Detroit River. Additionally, synoptic studies on the ambient environment and sources are being conducted on the Trenton Channel for a more detailed mass balance in this waterway. The majority of this work will be conducted in 1986. The potential for landfills along the river contributing pollutants through the groundwater is being investigated.

BOOKSHELF

The Freshwater Foundation has published a booklet, *A Citizen's Guide to Lake Protection*, which outlines and examines all aspects of lake management. Written in layperson's terms and illustrated, the booklet is available for \$2.00 from The Freshwater Society, 2500 Shadywood Road, Box 90, Navarre, Minnesota 55392. (612) 471-7467.

Janis Meldrum, Resources Management Specialist at Isle Royale National Park, has compiled the *Lake Superior Bibliography: A Compilation of References on the Aquatic Ecosystem*. The April 1986 bibliography includes a brief explanation of most listings and is available in printed form or on diskette. To request copies contact the author at Isle Royale National Park, 87 North Ripley, Houghton, Michigan 49931. (906) 482-0986.

As a result of a joint project of the Canadian Environmental Law Research Foundation in Toronto, Ontario and the Environmental Law Institute in Washington, DC, *The Regulation of Toxic and Oxidant Air Pollution in North America* has been published. The book

presents the findings and conclusions of their study into the science of toxic and oxidant air pollution, related laws and policies in Canada and the United States, as well as final reflections and recommendations. The book is available for \$27.95 from C.C.H. Canadian Limited Publishers, 6 Garamond Court, Don Mills, Ontario M3C 1Z5. (416) 441-2992. Discounts are available on multiple orders.

The most heavily used insecticide in the US from the 1960s to the mid-1970s, toxaphene is generally recognized today as a worldwide contaminant comparable to DDT and PCBs, according to a new technical report from the University of Wisconsin Sea Grant Institute. *Toxaphene: Status in the Great Lakes*, written by David Armstrong and John Sullivan, is the Sea Grant Institute's "Priority Pollutant" series of reports.

Although it was not used much in the Great Lakes region, toxaphene has been transported in the atmosphere from the southern region of the US and was detected in Great Lakes fish in high concentrations.

Copies of the report are available free of charge from the University of Wisconsin Sea Grant Institute Communications Office, 1800 University Avenue, Madison, Wisconsin 53705. (608) 263-3259.

The World Commission on Environment and Development is an independent, international body created in 1983 by a United Nations General Assembly resolution to look ahead at critical environment and development problems and propose better ways for the world community to address them. The Commission has published a revised version of *Mandate for Change: Key Issues, Strategy and Workplan*, which outlines the group's major agenda and goals for action. For a copy of the document contact Jim MacNeill, Secretary-General, World Commission on Environment and Development, Palais Wilson, 52, rue des Paquis, CH-1201 Geneva, Switzerland.

The Government of Ontario has published a report to the World Commission on Environment and Development titled *Common Shares in the Environment* in an effort to contribute to the commission's search for a common international ground on the environment and development. The report was prepared by several governmental ministries. For more information contact Ken Richards, Ontario Ministry of the Environment, 135 St. Clair Avenue West, Toronto, Ontario M4V 1P5. (416) 965-5115.

Author William Ashworth provides an environmental history of the Great Lakes region in his latest novel, *The Late, Great Lakes*. An analysis of the past and present condition of the Great Lakes provides a detailed look into what must be changed in the region if the lakes are going to be renewed and protected. The book is available for \$17.95 from Alfred A. Knopf Publishers, 201 East 50th Street, New York City, New York 10022.

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UC Great Lakes Regional Office
100 Ouellette Ave.
Windsor, Ontario N9A 6T3