be used as leverage points, the instruments by which governments may choose to influence the future."

"It appears that the energy decisions are being left to chance — to market conditions — and that such decisions do not reflect the true cost of the choice. The Board believes that there are still opportunities to make such choices. We are not forced into any particular position yet. The Board also believes that there is as much to be gained in improved Great Lakes water quality for the future by proper choice of the modes of energy production as there is in applying control technology after the energy technology has been established."

Findings

Some of the major findings of the SAB report were presented by Dr. Peter Meier, of the University of New York at Stony Brook:

1. Synfuels development does not appear to be a major issue to the Great Lakes Basin ecosystem, long range transport of air pollutants notwithstanding. Sources are too distant to be regarded as major sources of trace metals or toxic organics to the Great Lakes.

2. With respect to coal burning for electric power generation and industrial uses, existing emission sources are much more important than new emission sources. Improving controls and maintaining compliance at existing coal fired electric generating facilities proves to be much more important than small changes to the standards for new facilities. An illustration of this important distinction between new plants subject to New Source Performance Standards, and old plants that are not subject to those New Source Performance Standards follows:

By the year 2,000, 31% of the coal fired electric generating capacity is expected to be in new plants subject to New Source Performance Standards; 69% of the capacity will remain in plants that exist now. That 31% of the capacity is expected to be responsible for only 7% of the particulates, 2% of the lead, 12% of the sulfur dioxide, 7% of the zinc.

3. Data uncertainties concerning emissions from coal fired generating facilities prevent good analysis. There are uncertainties on trace metal content of coal, and over their fate.

4. The trace metal pathways are very poorly quantified. There are discrepancies between application of models of atmospheric transport to what we think we know about emissions with what is actually observed. Until such time as we have much better monitoring of ambient conditions for some important trace metals, little can be done to accurately quantify the pathways from points of emission to the receptor points; and therefore little can be done to identify good strategies for mitigating potential environmental effects. Better coordination of models is necessary and additional research is needed to better determine trace metal and hazardous material pathways.

Wise Use of Energy

Science Advisory Board member, Dr. John R. Sheaffer presented the Board’s comments concerning wise use of energy. "It appears that there is an opportunity to reduce the energy to gross national product ratio by as much as 50%. What that means is we are using perhaps 50% more energy than we need to produce our goods. Attainment of such efficiency means a stronger economy. It helps to control inflation. Conservation of energy is the lowest cost energy supply open to us. It impacts on the balance of trade. It has impacts on jobs because efficient use of energy is labor intensive. Attainment of efficient use of energy does not mean a reduction in the quality of life. Efficiency is the common link between a healthy economy and a clean environment. Both are brought about by using our resources efficiently."

Recommendations

Dr. Rodgers provided an overview of the Board’s recommendations stemming from its energy report. "There is real potential for near zero, perhaps even a reduced rate of growth in Great Lakes Basin energy use. While most jurisdictions have energy conservation programs, there is still considerable potential to further reduce the demand. It is the Board’s view that this consumption can be reduced.
FOCUS

without a loss in the quality of life. More efficient and effective use of energy offers both the opportunity to deal with existing problems and to plan for the future growth without having the problem accelerate, and the opportunity to demonstrate a more reasonable approach to effective use of the energy resources which we have. We recommend that the International Joint Commission request integrated information from the Parties (United States and Canada) regarding their programs for making more effective use of energy."

"The Science Advisory Board recommends that the International Joint Commission encourage the Parties to direct studies for identifying the energy alternatives best suited to the achievement of overall environmental quality and to promote the development and use of the alternative so identified. We are recommending a positive influence at the planning stage through the wise selection and mix of energy sources, the sites at which the technologies are developed, and the use to which they are put."

"We urge the Commission to promote coordination of the choice of energy options amongst the jurisdictions to avoid cost inequities or reduce the negative impacts on the Great Lakes Basin. We further recommend that the International Joint Commission encourage the Parties to coordinate the planning and use of energy alternatives in the Great Lakes Basin."

"The International Joint Commission is asked to encourage research into sources and pathways of hazardous substances and monitoring to evaluate which hazardous substances may produce significant adverse environmental or health effects so that we may facilitate the identification of the impacts of existing and future energy alternatives."

Water Quality Objectives

Dr. William Strachan of Canada Centre for Inland Waters, spoke for the Aquatic Ecosystem Objectives Committee (AEOC). "Objectives are minimum levels which the Committee believes will protect all the various uses which are not described in the 1978 Great Lakes Water Quality Agreement, but which are alluded to. The Committee's report presents three recommendations, two of them dealing with specific chemical substances and the third one noting a problem with respect to limited use zones. In addition to these recommendations there are a number of research needs listed. The Committee feels that these would be extremely helpful, even essential, in the development of objectives under the Great Lakes Water Quality Agreement."

"The Committee examined literature and government reports on Selenium and concluded that the old objective of 10 \( \mu g/L \) for protection of raw water supply should be replaced with a system-oriented set of objectives: 1 \( \mu g/L \) for water, 5 \( \mu g/g \) in sediments, and 3 \( \mu g/g \) in fish. This is to protect aquatic life."

"The second substance that AEOC dealt with was mirex. The Committee sees no reason to change its previous recommendation for the substance to be substantially absent from the Great Lakes ecosystem."

"Formerly proposed objectives for pentachlorophenol, lead, dioxin, phosphorus, temperature, chlorine, and cyanide were again submitted to IJC."

"The current Agreement specifically calls for identification of all limited use zones and for development of a mechanism to reduce the extent of zones in the future to provide for a healthy Great Lakes System. Dr. Strachan stated: "There does not appear to be much progress in these matters, and the Committee is concerned because the zones are areas where the objectives are not met. Unless some means of limiting them can be agreed to, the protective purpose of the objectives cannot be met."

In its report the Committee recommends "that development of a comprehensive limited use zone mechanism be undertaken in fulfillment of the requirements of Annex 2 of the Great Lakes Water Quality Agreement. In support of this recommendation, the Committee further recommends the identification of all areas of outstanding natural resource and/or biological sensitivity as well as location and nature of all industrial and municipal discharges to the Great Lakes."

Surveillance Plan

Carlos Fetterolf, Executive Secretary of the Great Lakes Fishery Commission, commented on the Great Lakes International Surveillance Plan (GLISP) on behalf of the Board. He explained that Annex 11 of the 1978 Great Lakes Water Quality Agreement charges the Parties and state and provincial governments to develop and implement joint surveillance and monitoring programs. The Agreement states that these activities shall be undertaken for the following purposes: 1) To assess compliance—the degree to which control requirements are being met and achievement of general and specific water quality objectives; 2) to establish time and space parameters for non-achievement of objectives and therefore to identify the need for more stringent control requirements; 3) to evaluate water quality trends on a local and whole lake basis in order to assess control strategies, identify future needs,
4

develop predictive techniques, and identify emerging problems.

Mr. Fetterolf reported the SAB's conclusions. "Without such a program, the yardsticks would not be in place to accurately quantify the changes brought about by the billions of dollars spent on remedial programs. The Board concluded that the information generated by the GLISP could be enhanced and made more valuable to decision makers and other users through more rigorous processing and a timely review of the data. The Board concluded that increased emphasis on integrators and other biological indicators, coupled with reduced emphasis on water analysis for contaminants, would be beneficial."

"The Board has concluded that in order to increase the value and usability of the GLISP, the institutions and agencies with responsibility for Great Lakes System quality should continue and expand cooperative development of surveillance planning, integration, implementation, analysis, interpretation, and presentation. The Board is convinced that this enhancement can be accomplished using the existing committee structures of the International Joint Commission and the Great Lakes Fishery Commission, but acknowledges that the formal endorsement of such a cooperative venture and agreement to participate by environmental protection and public health agency administrators would facilitate progress."

WATER QUALITY

Introduction

New U.S. Chairman, Mr. Valdus Adamkus began the presentations of the Great Lakes Water Quality Board by reviewing the Board's history. "The Board was formed following the signing of the 1972 Agreement and has 18 members, nine from each country. The members are appointed by the Commission and wear a number of hats, both internationally and within our respective jurisdictions. For the most part, we are pollution control officials or resource managers who domestically have the responsibility and the authority to influence and implement pollution control measures which affect Great Lakes water quality."

State of the Lakes

Mr. Anthony Wagner, a Board member from Environment Canada, introduced discussion of the state of the lakes: "In a little more than a century the Great Lakes Basin has evolved from a backwoods subsistence economy to a highly geared industrial economy. Over 30,000,000 Americans and 7,000,000 Canadians — that's almost a third of the population of Canada — live in the Great Lakes Basin. As a result of this growth and the proximity of processing and receiving waters, human activities have seriously affected even these large bodies of water."

"Both the problems and the jurisdictional responses occur at three distinct levels: site specific, lakewide and systemwide. Traditionally, attention has naturally focused on site specific problems around the lakes, but with more and improved scientific investigations lakewide and systemwide problems have been better defined and the need to address them has become more apparent. Management of the Great Lakes involves 11 governments — two federal, eight state and one provincial — and a plethora of local government, universities and private sector agencies. Many are responsible for the conduct of surveillance and monitoring activities. The very number involved immediately suggests problems related to coordination, data quality control, data compatibility, etc. There is a need for a coordinated overall monitoring program."

Acting on the advice of the Water Quality Board, in 1975, IJC recommended such a program with specific sampling locations, frequencies, procedures and early warning capabilities; the use of standard methods of field and laboratory analysis of the samples, systematic quality control programs, and conformance in data storage, retrieval, verification, analysis, and utilization. By 1980, the Great Lakes International Surveillance Plan, (GLISP) was developed. The Plan is designed to be both dynamic and flexible, to respond to changing needs and priorities. It also provides the framework to facilitate long term planning of monitoring programs.

Mr. Wagner continued, "This Plan is unique to North America and, indeed, unique to the world. The data of the Great Lakes comprise the world's largest historically continuous, most exhaustive and most coordinated data set. The Plan does not meet all the expectations of all the researchers and all of the water resource managers. It does provide information to assist remedial program managers and policy makers in general in..."
arriving at rational and effective decisions in the overall management of the aquatic environmental quality of the Great Lakes.”

Mr. Wagner (and the Board report available from Windsor IJC) went on to describe the overall status of each lake, stressing the three main issues identified by the Board: toxic substances, eutrophication and airborne pollutants.

Board member for Ontario Ministry of Natural Resources, Dr. Douglas P. Dodge, provided the detailed status of the Lower Lakes. “In Lake Erie, ... the work that’s been done on spottail shiners indicated that PCB concentrations are on the decline. Similarly for specific areas in Lake Erie, total DDT residue concentrations are on the decline. Further evidence for these declines is apparent in trends of contaminants in offshore fish, open lake fish, and top predators, such as coho salmon and walleye. There is also evidence of declines in DDT and PCBs in herring gull eggs.”

“Annual loadings of phosphorus to Lake Erie are down about 10,000 metric tons since 1972, and these reductions are directly attributable to controls instituted under the 1972 Agreement for point source sewage treatment plants. These reduced loadings are contributing to improved water quality. The concentrations of total phosphorus in the western and central basins of Lake Erie have declined. We’re finding species more likely to be associated with cleaner water and lower phosphorus concentrations in water. However, there are still significant problems in Lake Erie that have to be faced in terms of controlling phosphorus sources from land use and from long range atmospheric transport.”

“On the Detroit River, some significant improvements in water quality should be noted. Loadings are down for suspended solids, total phosphorus, total iron, phenols, and chloride.”

“A special St. Clair River study was started in 1977 by the Ontario Ministry of the Environment. 84 different organic compounds were identified. All fish contained some contamination of aromatic hydrocarbons. 17 organic compounds were found in treated drinking water. Some of the other compounds are potentially lethal to fish. Data now suggest that bottom fauna (living organisms, mostly animals) are recovering, and the Board thinks that this recovery can be directly related to control programs placed on most of the chemical industry.”

“The four major organic contaminants in Lake Ontario are dieldrin, DDT, PCBs and mirex. Dieldrin is not decreasing; the three others are, as are dioxins in herring gull eggs. Several mechanisms contribute to this rapid clearance of some organochlorine compounds in Lake Ontario: control of inputs where possible, transport out of the lake and into the St. Lawrence River, loss through sedimentation and loss through the atmosphere.”

“Although there have been significant decreases in total phosphorus concentrations in the open lake surface waters of Lake Ontario during the spring season observed between 1970 and 1978, data from 1979 and 1980 indicate that perhaps we have reached a plateau or levelling off in this decrease. In Lake Ontario, nearshore concentrations of total phosphorus appear to have stabilized for the last four years, although the levels overall are significantly less than we measured before point source control began in the late 1960’s and early 1970’s.”

“Nitrogen in Lake Ontario waters has increased about 41% in the spring time sampling between 1969 and 1979 and this long term trend appears to be continuing. The significance of nitrogen concentration increases remains to be worked out.”

**Areas of Concern**

Mr. Walter Lyon, Water Quality Board member for Pennsylvania, explained the areas of concern concept. A summary follows.

The “problem areas” concept, previously used by the Water Quality Board, had limitations because there was no consistent approach, it was limited to reliance on water quality data, and it did not deal with sediments or biota. Now, designation of each area of concern is based on all available environmental data including water, sediment and biota.

The Board reviewed data, the impact on humans and the environment, the cause-effect relationships, and the regulatory or remedial programs. The guidelines which the Board established relate to Agreement objectives — are the values set being exceeded; how persistent is the compound; how well defined is the problem; how important or serious is the problem; how recent are the data? What kind of water uses are being impacted? How do the violations occur? How do discharges relate to the problem? What are the transboundary implications? Based on such criteria, the Board established two categories of areas of concern: Class "A", where beneficial uses are severely impacted; Class "B", areas where uses may be impaired. The following list names the 39 areas of concern in 1981. Details can be found in the Board Report.

https://scholar.uwindsor.ca/jcfocus/vol7/iss4/1
## AREAS OF CONCERN

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<tr>
<th>Class A - Beneficial uses severely limited</th>
<th>Class B - Beneficial uses may be impaired</th>
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<tr>
<td><strong>LAKE SUPERIOR</strong> - None</td>
<td><strong>LAKE SUPERIOR</strong></td>
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<td><strong>LAKE MICHIGAN</strong></td>
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<td>Milwaukee Estuary, including</td>
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<td>Milwaukee Harbor and its tributaries,</td>
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<td>the Milwaukee, Menominee and</td>
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<td>St. Marys River - Ontario/Michigan</td>
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<td>Detroit River - Michigan and Ontario</td>
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<td>Rouge River - Michigan</td>
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<td>Maumee River - Ohio</td>
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<td>Black River - Ohio</td>
<td><strong>LAKE ONTARIO</strong></td>
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<td>Ashatabula - Ohio</td>
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<td><strong>LAKE ONTARIO</strong></td>
<td>Oswego River - New York</td>
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<td>Buffalo River - New York</td>
<td>Toronto Waterfront - Ontario</td>
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<td>Niagara River - New York</td>
<td>Port Hope - Ontario</td>
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<tr>
<td>Hamilton Harbour - Ontario</td>
<td>Bay of Quinte - Ontario</td>
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<td>Cornwall/Massena - Ontario/New York</td>
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In the 39 areas of concern, 14 have problems with municipal sources of pollution, nine with urban drainage, including combined sewers, 25 from direct industrial discharges, two from indirect industrial discharges which go through municipal systems, two from nonpoint land drainage, and nine from waste sites and landfills.

### Toxic Substances

Mr. Lovell Richie, Board member for Minnesota, introduced the presentation on toxic substances. "I’d like to suggest that there are some other things that are not discussed in this report that others (besides governments) may do to lessen the problem. Why shouldn’t the generators of these toxic and hazardous materials bear a moral and social responsibility not to create unnecessary hazards with the materials that they develop for profit? Why does everyone seem to view this as a government problem? And why shouldn’t the consumer assume some moral and social responsibility to wisely use and properly dispose of some of these products, or maybe not use them at all?"

"It’s important to recognize that some chemicals are deliberately manufactured to be toxic — herbicides, insecticides, fungicides, the whole family of pesticides. They are useful to society precisely because they are toxic. The public benefits from these chemicals and at the same time assumes a risk. The public has long been aware of the dangers of toxic chemicals, especially when the symptoms rapidly appeared. Gradually, scientists have become aware of more subtle long-term effects and so has the public. They fear that the chemicals that contaminate their food and the water — the ones that they can’t see, taste, or smell — still cause them problems, and their concern is justified because we’ve measured such things in the Great Lakes.”

While some of the materials — DDT, PCBs, dieldrin and mirex, — are so persistent in the environment that their continued manufacture and use has been discontinued, there are other toxic chemicals that will continue, and should continue in use. Mr. Richie explained: "The key is proper use, management and disposal. All that translates to increased costs to purchase, handle, use and dispose of these materials. Either we pay the cost now or we pay later, perhaps manyfold, in the form of clean-ups. Clean-up costs are real costs, but there are other costs in the form of human health damage and crop damage that are much more difficult to develop and perhaps even impossible to prove conclusively.”

Mr. Kim Shikaze, of Environment Canada, summarized the findings and recommendations of the Toxic Substances Committee. "In reviewing all of the activities that are taking place, we identified as the fundamental problem the absence of an overall Great Lakes ecosystem strategy for toxic substances control activities. We found that programs tended to become compartmentalized..."
under specific legislative mandates, and there was very minimal coordination within and between the jurisdictions."

"We identified the need for priority lists of toxic substances for which inventory, characteristics, and environmental data must be gathered. We identified the need for a central mechanism to identify data sources. We found that inventories are not a static thing; they are dynamic. Therefore, there is a need for continually updating the data bases. In the characteristics area, there is a need for a continued development of structure activity correlations and other new screening mechanisms to aid in the assessment of hazards of toxic chemicals."

"We need better coordination of monitoring and surveillance activities relating to toxic substances. We need to expand on ecosystem studies of transport, fate, and the effect of ambient levels of toxic substances. There is a need to coordinate research and field monitoring of toxic substances in atmospheric deposition as well as in the water environment. Increased activity is required to provide better exposure data for the purposes of hazard assessment. We need better communication among the jurisdictions on hazard and risk assessment, and also in terms of exchange of the scientific data that's used for this purpose. There is a need for a coordinated strategy for the control of atmospheric deposition of toxic substances.

Finally, with respect to the issue of hazardous wastes, one thing that is needed is a common definition for 'hazardous waste'.

Dr. Robert Slater, Canadian Chairman of the Water Quality Board, responded to the Commission's interest in learning more specifics about the Niagara River's toxic contamination problems. He suggested that in 1972, when the first Agreement was signed, "the understanding of the toxins problem for the Great Lakes was very scanty...We thought that we were dealing with a handful of substances. That situation changed extremely rapidly, and was in a large measure influenced by the ability of scientists to detect persistent toxic substances in the environment at low concentrations. Coincident with that improvement has been a very rapid increase in the number of compounds that have been detected."

When the Water Quality Board started to advise the Commission on the state of the Niagara River in 1973, it was described as a problem on the basis of 1972 Agreement water quality objectives. The Board brought the violation to the IJC's attention with recommendations. Dr. Slater stated, "The rules changed in 1978. The 1978 Agreement stressed the nature of the toxic substances problem in the Great Lakes and called for programs to virtually eliminate toxic substances. Today the intention of the various agencies that are working on the Niagara River is to undertake measurements in the environment which should be used to pinpoint the sources of the materials found and then used to establish corrective measures which would eliminate those materials from the environment, reduce them to a harmless level or, if we don't know what harmless is, down to zero."

Mr. James Marshall, of EPA's Region II in New York, told the UC the current status of the Niagara area problems. He said that the city's sewage treatment plant was specially designed with an activated carbon process to treat the heavy load of industrial waste of Niagara Falls, but shortly after it started up in 1978, the carbon system failed. Since then the plant has been operating only as a primary sewage treatment plant, removing suspended solids, but not providing treatment to the chemical wastes. The proposed solution is to repair the carbon system using monies that EPA has already provided to the City of Niagara Falls and at the same time to study what is needed beyond repair of the system to prevent further failure.

Mr. Marshall assured the Commission that "There will be a tighter discharge permit for the plant once it has been repaired and set back in proper operation. In addition to the repairs, the city is proposing an enhancement program for the plant which will allow an evening out of the industrial load and adjustment of the pH, one of the problems that led to the collapse of the system."

Speaking about another aspect of the Niagara frontier problem, Mr. Marshall said, "New York State had adopted a very aggressive program of inventorying, surveying, monitoring and cleaning up dumps as they are identified. There are some 30 to 40 so-called "priority one" abandoned waste dumps in the Niagara frontier area. Our role at EPA has been to work through the Superfund Program to enhance the state program. The major effort that we have been making is on the Love Canal site. Another site is the Wheatfield dump. The other way that we are addressing hazardous waste dumps is through litigation and enforcement."

Dr. Slater resumed, commenting, "I think the Board would tell you that... by and large the burden on the environment has gone down over the last decade. If one asks residents of the Niagara Region whether they feel that the toxics problem has improved over the last decade, their answer would probably be a resounding no. It may be worthwhile to explore why."
“Some ten years ago when acceptable environmental quality levels were almost exclusively employed to determine the adequacy of the state of the environment, we were in a position to use, almost undiluted, the advice of scientists. That advice really constituted public policy. We now look to science for information, but it does not per se establish public policy.”

The public is concerned because absolute answers to scientific and technical questions are few, but the questions are many and seem significant. The errors of the past have created a climate of doubt and a lack of trust in governments’ ability to manage the toxic substances problem. Dr. Slater said, “What caused the problem was mismanagement based on ignorance demonstrated by all parties that were involved, both the private and the public sector. The questions are: have we learned from that; have we learned quickly enough; have we learned the proper lessons; and, are we trying to apply those lessons that we learned correctly?”

“The risk that you experience by standing on the Love Canal site or being exposed to certain sorts of fumes or drinking certain sorts of waters, can be measured on a probability basis as being analogous to smoking so many cigarettes in your lifetime or travelling so many miles in a car or an airplane. Clearly you cannot instruct somebody not to feel threatened, but one perhaps could institute, or continue the process of education which has got us to a point where we understand what science can’t do for us and perhaps to understand somewhat better what it can do. What science can do for us is provide us with information which allows us to understand the consequences of the risks that we face when we make various choices. Those in the arena of public policy must recognize that a voluntary risk — for example, a decision to smoke a cigarette — is viewed in a totally different way from exactly the same risk to health posed by exposure to city ambient air which one has to breathe. An individual will feel much more threatened by an involuntary exposure.”

**Human Health**

Dr. George Becking, Board member from Health and Welfare Canada, told the IJC: “The Health Effects Committee was formed in 1978. The Committee assesses the risk to health posed by contaminants in the Great Lakes ecosystem, reviews action levels in guidelines for selected substances, provides interpretations to the IJC through its Water Quality and Science Advisory Boards, and maintains awareness of current advances. The group began by listing all chemicals found in the ecosystem without evaluating or quantifying amounts. The task was to take that list of chemicals and, on the basis of human health considerations, set priorities for future monitoring.”

“The 1980 report listed those chemicals with chronic effects in humans, chronic effects in mammals, and those which had acute toxicity. During 1981 there was closer examination of 381 chemicals. 23 are now subject to regulatory monitoring; that is, there are either drinking water guidelines, fish guidelines or a water quality objective under the 1978 Agreement. 34 chemicals causing chronic effects in mammals are not subject to regulatory monitoring.

Based on toxicology and exposure, 122 chemicals would pose minimal concern from a human health perspective for future routine monitoring and surveillance. There are 192 entries about which there may be isolated pieces of toxicology, but insufficient data for us to say a health hazard exists.”

The Committee made several recommendations regarding health hazards to humans and the Great Lakes ecosystem. Inventory and use data, monitoring, list refinement, industrial by-products identification, increased emphasis on data requirements for assessing human health risks, and greater emphasis on microbiology were topics of the recommendations.

Dr. Becking expressed a personal view: “There should be continual vigilance in monitoring microbiological parameters within the Great Lakes Basin. More work should go into the surveillance techniques.” He explained that indicator organisms used now do not directly relate disease outbreaks to the level of the indicator organisms. One major recommendation from the microbiologists on the Committee is improved reporting of waterborne diseases.

**Eutrophication**

In 1972, scum and slime were in the bays and rivers flowing into Lake Erie. Since then Canada and the United States have spent or committed $6.65 billion for municipal wastewater treatment facilities in the Great Lakes Basin. The money and efforts paid off. In 1981, for the first time, major municipal plants around Lake Erie and Lake Ontario averaged 1 mg/L of phosphorus in their discharges, meeting the goal of the 1972 Agreement.

After presenting the above information, Ontario Ministry of the Environment Water Quality Board member, Mr. William Stegges, advised: “If we’re to continue our good works that we began in 1972 in a coordinated way, we will want to continue to reduce pressure on the lake.
system so that any remaining vestiges of floating algae and other damage that results from the presence of excessive nutrients in water will be taken care of. We’ve got to protect the investment we’ve already made. We must maintain our sewage treatment plants; the worn out parts that result from continuous use have got to be replaced. If we are to fully achieve the targets of the 1972 and 1978 Agreements, we can make further substantial gains by adhering to that 1 mg/L level right across the Basin. We must address the problem of combined sewers. We must continue what we have begun, but focus now on diffuse sources of pollution.”

Mr. Robert Courchaine, Board Member from Michigan, said: “Stormwater runoff and combined sewer overflow from urban areas are significant contributors to localized problems in streams, estuaries, harbors and nearshore areas. Combined sewer overflows contribute to water quality problems in five areas of concern: the Milwaukee Estuary in Wisconsin, the Detroit River, Cleveland, Ohio, the Clinton River in Michigan and Rochester, New York. Programs are underway in both Canada and the United States to determine the extent to which storm and combined sewer overflows contribute to the problems, develop and demonstrate cost-effective control technologies, and implement such technologies as appropriate.”

Agricultural Practices

Mr. Robert Goettmoeoeller, Deputy Chief, Division of Soil and Water Districts in Ohio, spoke from the audience about nonpoint source pollution control in Ohio, programs in the areas of urban sediment control, stormwater management and animal waste management. He said that “the farmers who are interested in getting the nutrients in agriculture or animal waste back on the land for crop production have no pollution problem. It’s difficult to tell farmers we have a water quality problem in Lake Erie, that we’d like them to solve it. What we say is we have an energy reduction need, and there are labor reductions using conservation and no-tillage methods of farming.”

“Farmers who are going to no-tillage find out they can get by with smaller equipment. Their costs, including interest, drop considerably.”

“Researchers have found that if we use no-tillage, keeping the residue on the surface, we’re going to reduce erosion considerably. Much research shows that we’re also going to reduce phosphorus runoff considerably.”

Research questions remain about nutrient management, chemical usage, adaptations of no-tillage practices to special soil types and other topics. Mr. Goettmoeoeller said that in the interim, while funds to answer the questions are not available, efforts to extend use of the techniques to save soil productivity and reduce phosphorus pollution will continue.

Shipping

Mr. Reginald Parsons, Board member from the Canadian Coast Guard, reported that overall, few shipping related problems exist; good progress is being made in meeting requirements in Agreement annexes dealing with pollution from shipping. He spoke of two new studies. “The two Coast Guards examined the impact or the possible impact of ballast water on public health and on the ecosystem of the Great Lakes. Those two studies were concluded in 1981, and the conclusion that we drew was that from the public health point of view there appears to be no identifiable problem. We did observe that non-indigenous foreign fauna can be introduced into the lakes by the discharge of ballast water and survive; therefore, there is an unknown potential for impact. The two Coast Guards proposed that the studies be forwarded to the Commission for transmission to the Great Lakes Water Quality Board so that people more expert than ourselves could study the results of the tests.”

Pulp and Paper

A summary of the report of a task force on discharges from pulp and paper mills presented by Mr. Victor Shantora of Environment Canada, follows. “Pulp and paper mills made significant improvement in effluent quality in the past 13 years and they can be expected to continue to do so. Some mills do contribute to problems in certain areas of concern so the regulatory pressure must not be relaxed. This industry sector is a source of persistent toxic substances, thus there is a need to characterize the effluents, both chemically and biologically, to find out what substances are there and which are harmful. Further, the control of these substances will need to be undertaken in a number of ways, certainly not just by clamping further controls on the effluents. Finally, the industry and the jurisdictions should ensure that the use of phosphorus is carefully monitored and controlled.”

Summary

Dr. Slater listed the Board’s three priorities under the Agreement: management of toxic substances, clean-up of the 39 areas of concern, and the need to better understand the Great Lakes System. He said, "It is our interest as a Board and as citizens of the Region to see that the most cost-effective, efficient use of public funds is preserved within the Great Lakes Basin for those things which are important to serve the needs of the Agreement. There is room for adjustment within existing programs which would not significantly affect the real commitment of governments to the Agreement. At the same time, however, it is absolutely essential that the cost-effective and useful programs are preserved with the sort of continuity that the program and the Great Lakes demand."
LETTERS TO THE EDITOR

The Great Lakes Fishery Commission and its cooperators appreciated the article about the signing of the Joint Strategic Plan for Management of Great Lakes Fisheries (Focus 7-3). However, there was a thousandfold error in economic impact of the combined commercial and recreational fisheries — it is 1.6 BILLION annual, not million as stated. The magnitude becomes obvious if you know there were about 24 million angler days in 1979. These figures are based on a study sponsored by the Fishery Commission involving all agencies with responsibility for Great Lakes fishery statistics. The report of this study (Talhelm, D.P., R.C. Bishop, K.W. Cox, N.W. Smith, D.N. Steinnes, and A.L.W. Tuomi. 1979. Current estimates of Great Lakes fisheries values: 1979 status report. 79-1:17 pp. mimeo. rep.) is available from the Commission at 1451 Green Road, Ann Arbor, MI 48105, (313) 662-3209.

Carlos Fetterolf
Executive Secretary
Great Lakes Fishery Commission

Thank you for making this impressive correction.
The Editor.

Several questions came to my mind while I was reading the article in the recent issue of Focus (Volume 7, Issue 2) titled “Rural Non Point Source Control in the Western Lake Erie Basin”. My questions are:
1. What is the area which is now being tested in the “no-till” projects?
2. Is it expected that the enhanced retention of phosphate will lead to a reduction in fertilizer requirements and hence a cost benefit to the farmer?
3. Is it expected that the increased layer of crop residue resulting from no-till farming will increase yield because of the retained soil moisture?
4. Could Mr. Christensen give us some idea of the target acreage that might be anticipated in the near future in the Lake Erie Basin? Does the author anticipate a substantial change in traditional farming practices in this area?

I find the new format of Focus to be most attractive.

H. C. Martin, Senior Advisor
Federal LRTAP Liaison Office
Atmospheric Environment Service
Environment Canada

The response obtained from Carl D. Wilson, Soil Scientist with United States Environmental Protection Agency’s National Program Office, is summarized below:
1. The implementation program covers three states and 19 counties. The counties are: in Ohio - Crawford, Seneca, Wyandotte, Sandusky, Hancock, Hardin, Putnam, Allen, Lorraine, Huron and Defiance; in Indiana - Stueben, Dekalb, Allen, Noble, Wells and Adams; in Michigan - Hillsdale and Lenawee. Land use is 70 to 80% in agriculture, with major crops of corn, soybeans, wheat, oats and some sugar beets.
2. If no-till is widely adopted, the soil erosion rate will be reduced and phosphates attached to soil particles will be kept from entering streams. In time when phosphorus builds up in the soil from excessive fertilization, additional applications will not significantly increase yield. The farmer can stop or reduce the amount he applies, thereby increasing net profits.
3. When moisture is lacking in the soil the no-till system will out-perform conventional tillage on well drained soils. To relate residue to increase yield — one can say it is beneficial, but if phosphorus is deficient in the soil, residue will not increase yield. From a long term perspective crop residue will increase soil tilth, reduce erosion, increase water retention and, assuming all other factors equal, increase yield.
4. EPA does not plan to fund additional demonstration projects. Long term implementation will be the responsibility of state and local agencies as well as the U.S. Department of Agriculture. EPA expects a substantial change in traditional farming practices. The high price of oil and gas will encourage use of no-till and reduced tillage practices.

Thank you, Mr. Martin, for your comment about our new Focus format. We have had several positive comments from our readers.

For our readers, no-till yield also depends on soil type. The technique sometimes has to be modified to ridge tillage to ensure there is enough moisture in the soil to enable seed germination.

THINGS TO SEE

The Environmental Assessment Section and the Information Services Branch of the Ontario Ministry of the Environment have prepared a slide show explaining the Environmental Assessment Act. It will be used as a supplement to talks given by EA Section staff. If you are interested in having a member of the Section give a talk to your group about the Act and present the show, contact: Victor Rudik, Assistant Director, Environmental Approvals Branch, Ministry of the Environment, 135 St. Clair Avenue West, Toronto, Ontario M4V 1P5.

Concern, Inc., of Troy, Michigan (One Northfield Plaza, 48098, 313-879-1333) has three short 16mm films: “Water, Water Everywhere”, “A Cleaning Day”, and “Dinner is Served” on topics of water use, hazardous substances and energy use, respectively. The films’ objectives are to raise awareness and help viewers to examine their attitudes while encouraging individual involvement in environmental issues. Each three-minute segment is a separate program designed to begin group discussion. Fact sheets and discussion guides are included. Write or call Concern, Inc. for cost information.
**FOCUS**

# Biomonitoring the Niagara

Besides minnows, clams and algae, analyses were used as innovative measurements during the past year to augment the array of conventional techniques which Ontario Ministry of the Environment (MOE) scientists use to monitor the quality of the water of the Niagara River. (New York State also uses bio-monitoring techniques in the Niagara River work). Scientists have found that analyses of animals and plants can reveal the presence of a number of pollutants in water and can also aid in pin-pointing sources of the contamination.

Of the three biomonitoring systems, the one using young spottail shiners—a small short-lived minnow species—has been developed and used by MOE scientists in the Niagara River since 1975. It has proven itself to be a sensitive, efficient and reliable method in a variety of locations on the Great Lakes.

The young fish, about 50 to 60 mm in length, spend the first few months of their lives within about a square mile of their spawning ground. Juvenile spottail shiners are collected from nine sites on the Niagara River. The catch is deep frozen on site and delivered for analysis to the Ministry’s laboratory. Analyses of the whole fish can indicate changes in levels of such contaminants as PCBs, mercury, organochlorine pesticides, chlorobenzenes and dioxins. They can help identify the sites at which the pollutants enter the river.

Freshwater clams of the species *Elliptio Complanatus* have been in use as biomonitors in other areas. Experimental use of the clams in the Niagara in 1980 has shown that they can serve as very good indicators of the presence of trace quantities of organochloric pesticides and PCBs in water.

During the spring and summer of 1981 a sufficient amount of these 65 to 70 mm clams were harvested in the clean water of Balsam Lake. The animals were then placed in groups of about 5-10 into plastic or metal cages and deposited at 2 metres depth at 15 locations along the shore of the Niagara River. Three weeks later the cages were retrieved and replaced by a new set of clams for another three weeks exposure. The clams are shucked on site, wrapped in aluminum foil, deep frozen and delivered to the Ministry’s laboratory for analysis.

In June, July and August, near sites used for the clam-test and fish collections, *Cladophora* samples were collected. *Cladophora* are green filamentous algae which grow in abundance throughout the

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*Cladophora* growing on rocks along the Niagara River. (Courtesy Ontario Ministry of the Environment)
Niagara system attached to permanent waterline structures. 

Cladophora accumulates heavy metals (mercury, lead, arsenic) and certain organic contaminants (PCBs) in concentrations well above the levels found in water.

Each sample was collected from a 50-100 m stretch of shoreline, wrapped in absorbent paper and shipped on ice to the Ministry's laboratory for analysis of internal trace contaminant levels. In comparison to 

Cladophora collected along remote shores of the Great Lakes, preliminary evaluation of Niagara River 

Cladophora has shown elevated accumulations of metals. The 1981 harvest is expected to confirm these preliminary findings and to indicate point sources of these contaminants.

These Ministry of the Environment biomonitoring projects are partially supported by Environment Canada funding under the terms of the Canada/Ontario Agreement on Great Lakes Water Quality. The projects are conducted on both sides of the Niagara River in cooperation with the Niagara River Toxics Committee, an international body that includes representatives of Ontario, Canada, New York State and U.S. environmental agencies. (Based on a story in Legacy, November-December 1981)

BOOKSHELF

The Parliamentary Subcommittee on Acid Rain published its findings on that topic in a report entitled "Still Waters". The document criticizes provincial governments and the Canadian federal government, urging that control efforts begin at home. It also supports continuing the effort to persuade the United States to reduce its acid rain-causing emissions. Thirty-eight recommendations are presented in this well illustrated 150-page, full color report available from the Ministry of Supply and Services Canada as Catalog No. XC29-321/2-01E at Place du Portage III, 11 Laurier Street, Hull, Quebec K1A 0S5.

Environmental Education Activities Manual, fourth edition, is now available for distribution. Edited by William B. Stapp and Dorothy A. Cox, this newly revised single volume edition contains 300 activities written by teachers for teachers. The manual contains an interdisciplinary environmental education philosophy with an international focus and a more comprehensive, in-depth instructional model. Complete grade level activities are geared to help the learner understand basic environmental education concepts, develop needed problem solving skills, clarify environmental values, and become involved in community problem solving action. Activities are arranged by grade levels, K-12. Also included is an updated resource materials section. Send for price information from: Dorothy Cox, 32493 Shady Ridge Drive, Farmington Hills, MI 48018. (Natural Resources Register, 9/81)

Energy & Education is a newsletter published bi-monthly during the academic year by the National Science Teachers Association. It is free for the asking from: Energy and Education, NSTA, 1742 Connecticut Avenue NW, Washington, DC 20009.

Energy and Man's Environment (7874 SW Nimbus, Beaverton, Oregon 97005; 503-641-9043) publishes an annotated bibliography of current key resources for energy and conservation education called "The Energy Education Bibliography". Designed as a resource tool for teachers of grades K-12, adult education groups and curriculum planners, the Bibliography lists activity guides, background reading, games, newsletters and references. The fourth edition is in preparation. Write to the Oregon address for cost and availability information.

EVENTS

The United States Geological Survey and the Center for Environmental Research at Cornell University will present a Northeast Conference on The Impact of Waste Storage and Disposal on Groundwater Resources, June 28 - July 1, 1982 at the Sheraton Hotel in Ithaca, New York. The co-sponsors are U.S. EPA and New York
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State's Departments of Health and Environmental Conservation. For details, contact: Juli Belli Mier, USGS, 521 West Seneca Street, Ithaca, New York 14850, (607) 272-8722 or FTS 882-4222.

The Bureau of Explosives, the Chemical Manufacturers Association, the United States Coast Guard, and the United States Environmental Protection Agency are sponsoring a Hazardous Material Spills Conference. The conference will be held April 19-22, 1982 at Milwaukee Exposition and Convention Center, Milwaukee, Wisconsin.

Topics addressed will include superfund perspectives, emergency response capabilities, and detection/monitoring, including specific and general information on chemical cleanup. Further information may be obtained from: 1982 Hazardous Materials Spills Conference, Suite 700, 1629 K St., N.W., Washington, D.C. 20006, or telephone (202) 296-8246.

**BRIEFS**

Plans to immediately close the United States Environmental Protection Agency's Large Lakes Laboratory at Grosse Ile, Michigan (outside Detroit) appear to be in abeyance.

The Environmental Emergency Branch of the Environmental Protection Service - Environment Canada has contracted with M. M. Dillon for developing a Dangerous Goods Equipment Directory. It is to list equipment, materials and systems used for the clean-up and disposal of dangerous goods spills. For more details contact: M. Fingas, EMS-EPS, Environment Canada, Ottawa, Ontario K1A 1C8, (613) 997-3921; or Mike Scott, M. M. Dillon, Box 219 - Station K, Toronto, Ontario M4P 2G5, (416) 482-5656.

**Great Lakes Protection Act**

H. R. 3600, "The Great Lakes Protection Act" (see Focus 7-3, p. 12) was the topic of a hearing before the United States House of Representatives Committee on Science and Technology on December 15th. The one-day hearing was designed to receive testimony in support of the policy statement made in Section 201 of the bill which outlines the importance of the Great Lakes as a unique natural resource which should be protected by federal legislation. Hearings will be held in 1982 on other sections of the bill concerning research coordination, environmental impact analysis, enforcement, interagency cooperation, and dissemination of information. The bill currently has 27 co-sponsors.

At the first hearing supportive testimony was given by: Congressman James Blanchard (the author of the bill); Len Barnes, of the American Automobile Association; Dr. Paul Eisele, Administrator for Water Quality and Land Use Programs of Detroit Edison; Representative Tom Anderson, of the Michigan Legislature; Mal Sillers, Meteorologist for ABC-Channel 7 in Detroit; Tom Washington, of Michigan United Conservation Clubs; Norman Roller, of the Sierra Club; and Dave Jaspers, of Project Lakewell.

Mr. Barnes' testimony concentrated on the importance of clean Great Lakes waters to tourism and recreation. The vital importance of the Great Lakes to industry and the economic revitalization of the Mid-west was the focus of Mr. Eisele's statement. State Representative Anderson underscored the value of the Great Lakes economically and aesthetically as well as for water supply. Mr. Sillers spoke of the Great Lakes as a national resource. He stressed their complexity and vulnerability to pollution, especially atmospheric, and urged their protection. The three speakers representing the environmental organizations expressed their concern for the fragile ecosystem of the Great Lakes, and spoke of past damage and the need for federal protection.

Congressman Blanchard said that many people tend to undervalue the importance of the Great Lakes. He pointed to the importance of a continuing, large scale education effort directed toward the general public and political officials throughout the United States, thereby making people aware of their direct and indirect dependence on the Great Lakes. He told the Committee: "This legislation, which makes the protection and preservation of the Great Lakes a matter of national policy, is designed to further this educational process. Once we achieve a shared awareness of the importance of the health of the Great Lakes to our national interest, our combined efforts to protect and preserve them can begin in earnest."

**FOCUS FOLLOW UP**

More on Waste Exchanges

Focus 7-3 carried on article on Waste Exchanges excerpted from the March 1981 issue of Resource Recovery Update. The source was deleted inadvertently when copy for the issue was trimmed the final time. Apologies to the National Center for Resource Recovery, Inc., (1211 Connecticut Avenue NW, Washington D.C. 20036), publisher, and a good source of related information.

The article sparked some reader interest in obtaining more information, especially about the facilities in the Great Lakes Region.

Eleven waste exchanges are operating in Great Lakes Basin States:

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ILLINOIS:
American Chemical Exchange
4849 Gold Road
Skokie, IL 60077
(312) 677-2800
Tom Hurvis
Materials Exchange
Environmental Clearinghouse Organization (ECHO)
3526 Maple Lane
Hazel Crest, IL 60429
(312) 933-7777
William Petrich
Information Only
Industrial Material Exchange Service
(principal mailing address)
1-EPA/DLPC-24
2200 Churchill Road
Springfield, IL 62706
(217) 782-6760
Larry Moore
Information Only
OR
(for confidential listing)
Industrial Material Exchange Service
Illinois State Chamber of Commerce
215 E. Adams St.
Springfield, IL 62701
(217) 522-5512
Sidney M. Marder
Information Only
NEW YORK:
Enkam Research Corp.
Box 590
Albany, N.Y. 12201
(518) 436-9684
J. T. Engster
Consultants
American Alliance of Resource Recovery Interests, Inc.
North East Waste Exchange
700 E. Water Street, Rm 711
Syracuse, N.Y. 13210
(315) 422-6572
Walker Banning
Information Only

Those of you in New York State might want to pursue information on the Industrial Materials Recovery Act. It is assigned to the New York Environmental Facilities Corporation the responsibility to assist industries to reduce, reuse and recycle wastes. One phase of its effort is the area of waste exchange. EFC is contracting with Northeast Industrial Waste Exchange. (See list.)

PENNSYLVANIA:
PA Waste Information Exchange
222 N. Third Street
Harrisburg, PA 17104
(717) 255-3279
Tricia Overmeyer
Information Only
National Waste Exchange
P.O. Box 190
Silver Springs, PA 17575
(717) 780-6189
Ron Schable
Materials Exchange
OHIO:
ORE Corporation
2415 Woodmere Drive
Cleveland, OH 44106
(216) 371-4869
Richard Immerman
Materials Exchange
Industrial Waste Information Exchange
Columbus Industrial Assn.
1646 W. Lane Ave.
Columbus, OH 43221
(614) 486-6741
Newton Brokaw
Information Only

INDIANA:
Environmental Quality Control
Waste Materials Clearinghouse
1220 Waterway Blvd.
Indianapolis, IN 46202
(317) 634-2142
Noble L. Beck
Information Only
For further information about the exchanges, contact the U.S. Environmental Protection Agency, Office of Solid Waste, 401 M St., SW, Washington, D.C. 20460

More on Environmental Quality Index

Several readers have asked for additional material relating to Carol Steinhart’s article. In response:

Suggested Reference Material


For copies, write to Carol Steinhart, Water Resources Center, University of Wisconsin, 1975 Willow Drive, Madison, Wisconsin 53706.

ATTENTION GREAT LAKES INDEX USERS

The Great Lakes Nearshore Index (GLNI) described in Focus Issue 7-3 is being evaluated formally by co-authors Gordon Chesters and Linda-Jo Schierow at the University of Wisconsin Water Resources Center. The assessment will determine whether the index is performing adequately as a communication device between various user groups. Part of the evaluation will be based on the results of a survey of user opinions. If you have used the GLNI or if you plan to use it before June 1982, please notify the researchers immediately at: Water Resources Center, 1975 Willow Drive, Madison, Wisconsin 53706 or telephone (608) 262-1136.
FOCUS

briefs cont’d ...

Canada is spending more than 1.5 million dollars lobbying the United States Congress, the Reagan Administration and the American people to publicize its concerns about acid rain. (World Environment Report, November 15, 1981).

According to a Louis Harris poll in the fall, 80% of the United States public does not want to have federal air pollution regulations relaxed.

PEOPLE

Robert C. McEwen a lawyer and former United States Congressman from Ogdensburg, New York, became the Chairman of the United States Section of the International Joint Commission early in November.

During the years 1964-80, Mr. McEwen served eight terms in the United States House of Representatives. The district he represented, New York’s 30th Congressional District, borders Lake Ontario, the St. Lawrence River and Lake Champlain.

While in Congress, he was a member of the American delegation to the Canada-United States Interparliamentary Group and was a member of the steering committee of the Northeast - Midwest Congressional Coalition and the Great Lakes Conference of Congressmen. Before his election to Congress, Mr. McEwen was a member of the New York State Senate for 10 years.

Mr. McEwen was born in Ogdensburg, New York in 1920. He is a graduate of the University of Vermont and also attended the Albany School of Law. He has received honorary degrees from St. Lawrence University (LL.D.) and Clarkson College (D.Sc.).

Early in November, the IJC appointed Valdas V. Adamkus to be the United States Chairman of the Great Lakes Water Quality Board. Mr. Adamkus is Regional Administrator of the U.S. Environmental Protection Agency, Region V, which covers the states of Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin. In the Region, he is responsible for the administration of all federal environmental programs, including air and water pollution control, solid and hazardous waste disposal, and control of pesticides, toxic substances and radiation in the environment.

In 1978 Mr. Adamkus received EPA’s highest environmental award, the Gold Medal for Exceptional Service, for distinguished leadership in Region V and for outstanding contributions to international environmental control.

Mr. Adamkus serves intermittently as Special Representative on Eastern European environmental affairs for US EPA, and has been involved in environmental negotiations with the USSR, lectured in the USSR and reviewed scientific projects in Poland. He speaks five languages: Russian, German, Lithuanian, Polish and English.

Dr. M. Husain Sadar is a new environmental chemist for IJC-Windsor. His responsibilities include examining the fate of chemicals in soils. Born in Lahore, Pakistan, Dr. Sadar was educated in Turkish, American and Canadian universities, earning his Ph.D. from the University of Saskatchewan, and doing post-doctoral work at the universities of Ottawa and Manitoba. During his studies he received several distinctions, including the Saskatchewan Research Council and National Research Council Awards.

Dr. Sadar is an active and frequently published researcher whose special research includes enzymatic interaction of toxic environmental pollutants. He is keenly interested in developing biological indicators to assess the hazards associated with the use of agrochemicals.

Dr. Sadar was awarded a NATO Senior Scientist Fellowship to perform work on pesticides use in Turkey. He has also served as a UN expert in Pakistan and is an honorary advisor to the Pakistan Agricultural Research Council. In September 1981, at the invitation of the International Federation of Institutes for Advanced Studies, a wing of the Nobel Foundation, he spoke on the topic of science and religion in Stockholm, Sweden.

Canadian Chairman of the Great Lakes Water Quality Board, Dr. Robert Slater, has been appointed Assistant Deputy Minister for the Environmental Protection Service in Ottawa.

LAW AND THE COURTS

The United States Court of Appeals for the District of Columbia dismissed the suit brought by Ohio and two of that state’s electric power utilities seeking judicial review of former U.S. Environmental Protection Agency Administrator Douglas Costle’s news release concerning application of Section 115 of the Clean Air Act. (FOCUS 7-2, page 13; 7-1, page 4) That section, if applied, could enable EPA to direct Ohio and other states to control sulfur emissions which are believed to contribute to damage caused by acid precipitation in Canada. Ontario’s attempt to intervene in the suit was unsuccessful. EPA has not taken action under Section 115. (Source: International Environmental Reporter, November 11, 1981)

Ontario’s Ministry of the Environment recently introduced amendments to the Environmental Protection Act aimed at curbing unauthorized or improper dumping of wastes.

https://scholar.uwindsor.ca/jcfocus/vol7/iss4/1
In welcoming the UC to Cleveland and presenting a proclamation to the two Chairmen, Mayor George Voinovich remarked, "The Great Lakes are probably the greatest economic resource development tool we have. We ought to do everything in our power to make sure we preserve that great asset."

**ENERGY EDUCATION**

During November the National Council for the Social Studies held its Annual Meeting in Detroit. Your editor had the opportunity to tour the exhibits area and collect samples of energy education materials. The groups listed below were represented.

1. Ministry of Government Services, Publications Centre, 880 Bay Street-5th Floor, Toronto, Ontario M5A 1N8 - Jack Davis - 416-965-2177. (Free)
4. Conservation Consultants, 417 Thorn Street, Sewickley, PA 15143. (Priced)
5. U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830. (Free)
6. Thomas Alva Edison Foundation, Cambridge Office Plaza, Suite 143, 18280 West Ten Mile Road, Southfield, Michigan 48075 - 313-559-1780. (Priced)
7. Social Studies School Service, 10,000 Culver Boulevard, P.O. Box 802, Culver City, CA 90230-0802. (Priced)

Many other sources of teaching materials exist. If you have discovered a particularly good source for energy or other environmental teaching aids, or an especially useful item, please write to the editor.

Perhaps you or someone you know may want to participate at the pilot-testing stage of two curriculum development projects:

1. The National Science Teachers Association's (NSTA) Project for an Energy Enriched Curriculum is looking for teachers willing to test energy lessons developed for substitute teachers. Three sets of ten one-day lesson plans (elementary, junior/ middle and high school levels) are ready. Lessons include science and social studies material and reinforce skill development in reading, math, vocabulary building and observation. Evaluation copies are available from: Energy Lessons for Substitute Teachers, NSTA at the above address (NSTA's Energy and Education, Vol. 5, Number 1, October 1981).

2. The Solar Energy Education Project has a new set of activities for art, music, social studies and language teachers of grades 7-12, designed for use in regular courses of study. A text covers the scientific, technical and social aspects of solar energy; the reader has current articles from popular periodicals; and the teacher's guide has advice on resources, apparatus and more activities. For a pilot test application form contact: Solar Energy Education Project, New York State Education Department, Albany, New York 12234.

**FOCUS**

On Great Lakes Water Quality

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

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