

# **Human Health Effects from Toxic Chemicals in the Great Lakes**

**A Report on a Follow-Up Public Workshop**

**July 19-20, 1991**

**Georgina Inn, Jackson's Point,  
Lake Simcoe, Ontario**

September 1991



**Great Lakes United**

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# Executive Summary

Great Lakes United, under contract to Health and Welfare Canada, organized a public workshop to discuss the human health effects of toxic chemicals in the Great Lakes ecosystem. The two-day workshop was held at the Georgina Inn at Jackson's Point, Lake Simcoe, Ontario, from July 19 to 20, 1991.

This workshop was a follow-up to a similar workshop, held on the same dates in 1990, that provided the initial public review and commentary on Health and Welfare Canada's newly created Great Lakes Health Effects Program.

The forty workshop participants at the 1991 follow-up workshop represented a broad range of interest groups from throughout the Great Lakes Basin, including community and environmental groups, health organizations, native people, health professionals, industry, and government.

Workshop participants strongly recommended the need for the community to be actively involved in all phases of health research projects beginning with the planning stages. The involvement of members of the local community in health research efforts was emphasized as necessary throughout the workshop.

Participants strongly supported the need for research to be targeted to community concerns and to provide people with information that is helpful to them. The need for more effective distribution of information on contaminants in wild food was one such information need. Participants stated that there was a need for greater availability of fish consumption guidelines and posting of areas where contaminated fish and wildlife exist.

A yearly "Who's Who" of health research should be published. In addition, a clearinghouse of information on health effects of toxic chemicals should be established. It was recommended that such a clearinghouse should be organized using an existing non-governmental group.

A stronger education role for the 42 health units in Ontario was expressed. Communication between the various levels of government involved in health issues needs to be improved. Workshop participants recommended better education of medical officers of health and local physicians on specific Health and Welfare programs. Greater communication between Health and Welfare Canada

and Environment Canada and other agencies involved in the Great Lakes Working Group was identified as particularly important.

The participants recommended that a systematic communications network be established among the federal, provincial, municipal and local authorities to convey information to the public and to receive public response. The lines of communication between governmental agencies and nongovernmental organizations need improving.

# Introduction

In July 1990, Great Lakes United conducted a public workshop on human health effects from toxic chemicals in the Great Lakes Basin. This workshop was the first major public consultation activity of Health and Welfare Canada concerning the Great Lakes Health Effects Program (GLHEP). The GLHEP is part of an overall Great Lakes Action Plan to restore and preserve the Great Lakes Ecosystem.

Under contract to Health and Welfare Canada, Great Lakes United organized a second health effects workshop on July 19 and 20, 1991, at Georgina Inn at Jackson's Point on Lake Simcoe in Ontario.

The purposes of the 1991 follow-up workshop were:

To provide an opportunity for Health and Welfare to update participants on program activities since last year's meeting;

To provide groups and individuals with an opportunity to share their activities and actions during the past year;

To provide an opportunity for public review and comment on current and future research and other Health and Welfare program elements;

To provide an opportunity to further develop a network of people involved in health and environment related issues; and

To provide an opportunity to generate new ideas and actions by groups and individuals involved in the protection of health and the environment.

The forty workshop participants at the follow-up meeting represented a wide range of interest groups from throughout the Basin, including public health, education, environment, medicine, human fertility and breast feeding, fishing and hunting, religion, native communities, industry, agriculture, students, senior citizens, municipalities, cottagers, media, labour and public advisories. Eleven federal employees also participated in the presentations and discussion periods.

The workshop was broken into three distinct segments (see the agenda in appendix D). The first segment was a plenary review of the actions and activities of Health and Welfare Canada and other interest groups in response to the recommendations from the 1990 Workshop. This segment included presentations from Health and Welfare Canada officials on the specific research projects that Health and Welfare has currently undertaken. Summaries of the presentations are included as appendix A.

The second segment of the workshop was an opportunity for participants to respond and comment on the specific research actions of Health and Welfare. Advice and comment was provided to Health and Welfare on existing projects and other research needs. Four different breakout groups examined specific research projects.

The 3rd segment of the workshop focused on the actions that government and non-government groups can take in response to community based environmental health concerns. This portion of the workshop included four small group discussions and a final plenary session including all participants.

This report summarizes the content of discussions which took place throughout the two day workshop. Summaries of the overall plenary presentations and small group discussions are presented.

This report was prepared by Mary Ginnebaugh with assistance from other Great Lakes United staff and Board members and workshop facilitators.

Report design and preparation was done by Reg Gilbert.

## SECTION I

# Working Groups' Summaries on Future Research Directions and Needs

Four small working group discussions took place at the workshop, each with a different focus. The four are:

General Discussion of Future Research and Needs;

Food Safety;

Volunteering Human Tissue for Research; and

Human Reproductive Concerns.

### **General Discussion of Future Research and Needs**

The overriding theme of this working group was a need for community oriented research. These participants also strongly emphasized the need for the community to be actively involved in research projects from the beginning planning stages and throughout the entire project.

In making comments and recommendations concerning the future needs for research in the GLHEP, this working group focused on both governmental agencies as well as the non-governmental organizations that are concerned with toxic chemicals and human health effects.

The topics discussed and the recommendations made by these participants can be broken down into five distinct areas. The following is a summary of the comments and recommendations made for each area:

#### *Research Priorities*

The participants generally felt that human health research should be community-rather than population-based. It was also felt that areas for research should be well-defined, and the research should be based on the principle of the greatest good for the greatest number of people.

While it was suggested that research priorities should be given to areas where local authorities are reluctant to act on a problem, participants generally felt that the research conducted should be aimed so that the results resolve an existing problem.

It was suggested that the criteria Health and Welfare Canada uses to select research priorities be made explicit if such criteria are different from those found in the Great Lakes Water Quality Agreement.

Because of the uniqueness of the Great Lakes and the interactive relationship communities have with these bodies of water, there was consensus among these participants that research results from the Great Lakes Basin should not be compared to other industrialized areas. It was felt that this type of comparison resulted in an "as-good-as" interpretation that would not address the concerns of the involved communities and the definition of those concerns. It was suggested that several small, but similar communities could be chosen for comparison and statistical significance (as in the native study).

Other recommendations made concerning research priorities were:

Research results should be measured in terms of fifty years rather than five;

Preference should be given to community surveys or reporting over statistics;

The political process should not adversely affect the research agenda;

All research should have a sociological component.

### *Communication with the Media*

Workshop participants generally felt that there is inadequate media reporting on environmental issues. Further communication of health concerns is also a missing key component.

The working group felt that there must be greater involvement of journalists as a whole because they are a part of the community. It was suggested that seminars for invited journalists could be developed to explore Great Lakes health effects issues.



To develop a constructive working relationship between the community and the media, the participants suggested that key media people be targeted concerning health issues. A dialogue between the community and the media could then be created so that the media could better serve the community responsibly.

Workshop participants also recommended that communities should be encouraged to start their own media to serve themselves better.

### *Public Education*

Workshop participants unanimously agreed that education is a key component of the research project. The educational element, from pre-design throughout the life of the project, is as important as the scientific results of the project.

There was a strong recommendation that an effective, Basin-wide educational program on toxins and human health be instituted.

### *Regulatory Action*

Workshop participants felt that communities need joint cooperation with governmental and non-governmental groups to achieve results through regulatory action, but there was a general feeling of hopelessness regarding industrial discharge of toxic substances. It was felt that "legal" discharges of industrial waste are too high and that there is no effective way to stop industry from continuing to discharge toxic wastes.

The right of communities to determine actions for their future was expressed by some participants. Comments were also made that communities have a difficult time responding to threats from industry. The working group strongly recommended that the burden of proof concerning the toxicity of chemicals be shifted from communities to industry.

### *Community Action*

Participants strongly felt that accurate information and data should be made available to the public so that it can be informed and be able to respond. It is difficult for communities to keep pace with industrial research and technological change.

The group advocated community involvement with academic research to achieve greater accountability and awareness. Community ownership of research and results is critical.

Participants recommended that community members and governmental scientists should form groups to advise on research directions within the community, and that communities should generate their own information rather than just receiving what is directed to them.

## **Food Safety**

A general discussion of food safety within the Great Lakes Basin was initiated by posing several questions to the participants of this workshop.

Concern about the safety of food was expressed by the workshop participants. They noted that food was the primary pathway for humans to be exposed to contaminants. In reviewing the food safety regulations, the group felt that steps have been taken to produce food that safeguards the consumer. The various jurisdictions of these regulations, however, was not a primary concern.

The workshop participants strongly felt that the foods that cause the greatest concern were those that the public was most aware of being affected by contamination. Specifically, these foods were sportfish, wild game and vegetables grown outside the Canadian regulations for food contaminants.

When considering the specific foods the public is most concerned about, the participants felt that the information made available about these foods was important for making personal decisions to consume these foods. A concern was also expressed for the human reproductive failures associated with contaminated food consumed by Great Lakes Basin residents.

There was a general consensus by these participants that a threat to health exists from eating foods from the Great Lakes Basin. This risk, however, may be spread by eating a variety of foods, rather than having a concentrated diet of a few foods. Following published guidelines for consuming contaminated foods was considered important by this group. There was also a distinct concern for "public right to know" of contaminants in food and the "panic factor" that may result.

There was general recognition that government has played a large role in insuring the safety of foods, including programs in the Great Lakes Basin. The various levels of government that deal with inspections, research, testing and enforcing

regulations concerning food quality, however, were not specifically considered by this group of participants.

The group discussed the available information regarding contaminants in food and health issues. While there are many sources of information (governmental, health professionals, media, etc.), the role science plays versus the public's perception of what foods are unsafe to eat play important parts in information flow.

### **Volunteering Human Tissue for Research**

The intent of this workshop was to focus on the issues of sample collection for a pilot study to assess the distribution of contaminants in human tissue. The objective of the pilot study was to examine the relationship between the measured contaminant level in the blood and hair of volunteers and their fish/wildlife consumption history.

In discussing the issues of getting people to volunteer for tissue sampling and surveys, several points concerning both the process and the technical requirements were made. It was strongly felt by the workshop participants that human tissue collection and analysis was an extremely sensitive activity. There was concern that Health and Welfare officials should be cognizant of this sensitivity and proceed with caution. It was suggested that respected individuals (a trusted doctor or nurse) within the targeted community be used to fully explain the procedures and the reason for this kind of study. There was consensus that the perceptions of the process and the technical procedures held by the volunteers must be addressed by the researchers.

In terms of the volunteers selected for research, the need to identify a study group that would include healthy individuals as well as those demonstrating health effects was considered important. It was suggested that this study group may be identified by either its association with a pollutant or by suspected adverse health effect. Keeping a study group small would maximize support and cohesiveness among the study group. Consultations with local physicians, clinics and medical officers are also important in identifying suspected health effects.

In discussing the technical procedures for collecting samples from volunteers, it was suggested that the actual testing protocol be tried on a small group (i.e., Health and Welfare Canada officials) first.

Because there is a high degree of participation and involvement in this type of study, it was suggested that the volunteers be kept informed of the results from

the research as it pertains to them individually. It was recommended that test results be made available to both volunteers and their physicians if they chose. Reporting results should also include explanatory text.

Workshop participants suggested that the focus of any volunteer-based study be toward improving the health of the community. Participation in these types of studies may, in fact, lead to new avenues for research or even drive policy in environmental health issues.

## **Human Reproductive Concerns**

Workshop participants discussed the issue of environmental contaminants affecting the fertility of humans in the Great Lakes Basin. Since reproductive failures in colonial bird species show that such failures can be attributed to environmental contaminants, there is also concern for human reproductive infertility caused by environmental toxins.

It was pointed out that there has been an increased sensitivity to human infertility in Canada. It was felt by the participants that this sensitivity is largely due to the efforts of grass-roots organizations designed to help infertile couples.

There is, however, a lack of scientific understanding in the area of reproductive toxicology and environmental contaminants. It was suggested that industry's research on chemical toxicology was extensive but was not being shared with academic or governmental scientists.

Genetic, hormonal or anatomical factors are typically focused on as causes for fertility problems in humans, and as a consequence environmental contaminants are seldom considered as a potential factor in fertility studies. Attempting to interest fertility clinics and obstetricians in research projects concerning environmental contaminants is a real problem.

It was suggested by several participants that many of the women's organizations concerned with fertility have not been utilized as a resource to aid environmental research efforts.

It was recommended that greater participation among non-governmental organizations could increase awareness in the area of environmental contaminants and infertility.

## SECTION II

# Working Groups' Summaries on Community-Based Actions

Four small working group discussions focused on elements of Community-Based Actions. The four topics were:

Presenting Health Information to Individuals and Communities;

Methodology for Assessing Community Health;

Local Health Advisors and Planners: Working with Senior Levels of Government  
Actions for Protection of High-Risk Groups.

### **Presenting Health Information to Individuals and Communities**

The participants in this workshop were posed the question of how health concerns and environmental health information should be communicated to the public.

The participants in this workshop felt there needs to be greater availability and a stronger use of the guidelines (fish consumption guidelines, for example) that currently exist. It was suggested that posting areas, for example those areas not considered safe for fishing, could be used more to bring attention to a problem.

In order to help inform the public it was suggested that a yearly "Who's Who Directory of Research," with annotation of current environmental research projects and a contact person for further information should be made available to the public at large.

Because of the time, money and effort involved in informing the public of health issues, it was recommended that focus groups should be targeted for information, instead of the general public.

Community professionals and para-professionals within culturally relative and sensitive groups could be beginning points.

In order to ensure access to all of the available information the working group recommended that a clearinghouse for "one-window shopping" be established. A strong recommendation was also made to make research information available to physicians, health care units, hospitals and provincial medical societies before general release to the public.

In terms of jurisdictional aspects, there was a strong feeling that blocks to action often resulted when there is confusion over jurisdictional authority of the Federal and Provincial governments.

The participants openly discussed the form of the information that would be presented to the public. There was a strong recommendation that the data and information compiled by the government should be presented in a responsible manner. It was also strongly recommended that any information requested by communities or individuals should be thoroughly presented with availability for follow-up if necessary.

### **Methodology for Assessing Community Health**

The participants in this workshop initially focused on the use of a questionnaire for assessing community health. Rosalie Bertell has developed a standard questionnaire that could be used. A workshop sponsored by a non-government organization to explain the questionnaire as a methodology for assessing community health was suggested.

It was generally felt by the workshop participants that engaging in a health assessment activity could be viewed as a mechanism to empower the people within the community to achieve change. The workshop participants also discussed the importance of the assessments to focus on the communities' sense of their own problems. The psychological health of the community was viewed as an important component.

In discussing the issues of assessing community health, the workshop participants made a distinction between assessments to identify and verify a perceived problem and assessments to monitor the health of the community. In either case, however, the group felt that care should be taken to ensure that the questionnaire (or whatever method was used) was linguistically and culturally appropriate.

The issue of funding from Health and Welfare Canada for assessing community health was also identified as important. It was recommended that the results from the surveys conducted by Rosalie Bertell be published with available funds.

This working group also discussed the need to scientifically identify a community health problem before any specific action was taken. There was a general consensus by this group that the action taken to resolve a community health problem has priority over definite research results.

### **Local Health Advisers and Planners: Working with Senior Levels of Government**

In determining the overall context in which local health advisers and senior government health officials communicate, participants in this workshop first identified the information goal to be the immediate impact of the information conveyed to the public and the public's response.

The workshop identified different communication dynamics between the various levels of government, and there was a general consensus that more coordination between local and federal administrators was required.

There was a strong recommendation made by the participants that a systematic communications network be established among the federal, provincial, municipal and local administrators. There was a suggestion that a network system could use the existing communicable disease reporting system. Other suggestions made were to establish a newsletter for the health units, to use the existing media to tie health education to high-profile issues, and to educate the media.

In terms of the existing groups and individuals that could play important roles in disseminating information concerning health effects and the Great Lakes, the participants identified three groups: the 42 health units in Ontario, physicians and practitioners, and specialized groups such as nutritionists.

It was generally felt that Health and Welfare Canada is not perceived to have a high profile with the general public. The workshop participants felt that when there is a health problem people simply go to their doctor with the problem.

When the current means for communicating health concerns to the public were reviewed by the working group, the community health centres in the larger city centres were identified as having important roles. Native communities have established health communication systems through their environmental initiatives and by providing community ownership in these programs.

The participants generally felt that the education system is an important means of increasing awareness and information to the community. Such information

could result in motivating a wide range of people and age groups toward some action. A multimedia approach (speakers, radio, TV, newspapers, etc.) should be used, with flexibility and sensitivity toward adapting such information to meet community needs.

It was suggested by the working group that a hotline might be established to direct people to the right source for further information and help.

The participants discussed the role that the health units play within the province. It was suggested that while the health units have a mandate to communicate health concerns, this mandate is often unclear. It was also suggested that implementation of the mandate is often based on the interest level within the health unit. Workshop participants felt that health units provide a system that covers the entire province, but they have no resources to address the information dilemma.

### **Actions for Protection of High-Risk Groups**

The participants of this workshop identified honesty, credibility and outreach to be the attributes for actions to protect high-risk groups. In defining the "at-risk" populations, the participants included the rural and urban poor, women of child-bearing age, fetuses, the environmentally sensitive, the occupationally exposed, farmers and those dependent on groundwater.

In addressing the actions that can be taken to protect high-risk groups, the workshop discussed the various sectors within the framework of the overall community.

The need for honest, credible information put forth in language easily understood was identified as a basic requirement by the group. Suggestions made included short, public interest advertisements on TV, and educational programs for kids, which could also educate parents. "Community right to know," practical advice for physicians and the use of service clubs in relaying relevant information were also suggested.

Industry, as a whole, was identified as needing to become more involved in community efforts to protect high-risk populations.

It was suggested that industries should consider the use of less harmful alternatives when manufacturing products. There were several recommendations



that more representatives from industry be involved in this type of health effects workshop.

This workshop also identified a basic lack of trust that exists between high-risk groups and "the authorities." A need to gain back the trust of these groups was identified.

## SECTION III

# Relationship of Health Effects Research to Other Government Agencies

A strong sense emerged from this final session that health research should not impede or prohibit action being taken to address contaminant problems. Participants expressed the strong desire to see pollution prevention and chemical control programs expanded and fully implemented and that these could not wait until results of health studies were completed.

A final workshop plenary session focused on the relationship between health effects research by Health and Welfare and other government agency's programs.

A general presentation of how the various health effects programs within Health and Welfare relate to programs within Environment Canada was made to the workshop participants. While it was stated that both agencies have a responsibility to provide information to the public, integration of all the programs between the agencies is difficult. The need for improving the lines of communication was identified and strongly recommended.

An example of the cooperative efforts among three federal agencies was the newly released report on toxic chemicals in the Great Lakes, published jointly by Health and Welfare Canada, Environment Canada and Fisheries and Oceans.

The Great Lakes Working Group under the Great Lakes Water Quality Agreement is also considered a partnership to plan and implement research for six agencies on Great Lakes issues. The specific actions that are taken in implementing Remedial Action Plans result from the integration of various Federal and Provincial agencies.

These forums should be used to ensure that Health and Welfare's work is connected to the issues of concern to people in local RAP areas.

# Conclusions

There is a strong desire for assessing a community's health, community by community, and taking direct actions for improvement. The public looks to governments, both provincial and federal, to take the initiative in identifying, researching and resolving health effects issues. The continued integration of the Provincial and Federal agencies with the clarification of jurisdictional authority is strongly recommended. A healthy ecosystem is the ultimate goal in the Great Lakes Basin. Concern was expressed about the trap of using research to dictate the progress of regulation in cleanup actions.

Participants expressed the strong belief that research programs need to be responsive to the community and be sensitive to differences between communities. They also expressed the need for a stronger effort towards community information on health concerns to people throughout the Basin and to do so in their language and in a creative and informative manner.

The need to better integrate the non-governmental organizations with the governmental programs was strongly recommended by these workshop participants. The vital role the NGOs play within the community needs to be recognized and better utilized. Great Lakes communities should also communicate with each other in addressing their health concerns. The strong desire for an integrated educational and informational network was evident.

## APPENDIX A

# Presentations by Health and Welfare

### Overview of GLHEP: Andy Gilman

The GLHEP has a number of projects to protect people in the Great Lakes Basin from the effects of exposure to environmental contaminants. The current and proposed 1992 projects include public consultation activities, work on epidemiology, toxicology, and remediation, as well as objective setting and surveillance.

The critical need for government to respond to human health concerns, not only in creating a "healthful environment," but also by remediating and preventing unhealthy environments, is ongoing. While there continue to be general health concerns among Great Lakes Basin residents, there often exist specific community-based health effects problems that are not addressed by sweeping federal programs.

Recommendations to better educate medical officers of health and local physicians on specific programs under Health and Welfare Canada were made by participants attending this overview presentation. It was suggested that focusing on the health issues that relate to particular communities is a critical step in creating a community partnership with concerned citizens.

### Advisory Committee

A twelve-member public advisory committee has been created to further develop a participation strategy between the public and Health and Welfare Canada. The purpose of the advisory committee is to:

Provide advice to the agency on key health issues throughout the Great Lakes Basin;

Help determine and establish the priorities in the GLHEP; and

Allow for public participation in developing strategies for implementing programs.

Committee members represent nongovernmental organizations, industry, academia, government agencies, elected officials and native communities. The committee meets every three months.

The concerns of this committee are:

The community-based research, which has been defined by the community and effected by the community;

Taking information to communicate to communities; and

Determining how Health and Welfare Canada can effectively communicate with the community.

## RESEARCH ON REPRODUCTIVE TOXICOLOGY\*

### Great Lakes Health Effects Program

#### GOALS

- 1) To determine the reproductive toxicity\*\* of priority Great Lakes Contaminants; and
- 2) To develop more sensitive indicators of reproductive toxicity than are presently being used.

#### CURRENT PROJECTS

- study of the reproductive toxicity of lead in the female and male monkey
- further exploration of the reproductive toxicity of *Hexachlorobenzene* (a persistent chemical once used as an agricultural fungicide) in the female monkey and rat
- coordination of a multi-centre study designed to determine the concentration of priority Great Lakes Contaminants in the human follicular fluid (the fluid surrounding the egg) and in the seminal plasma (the fluid portion of an ejaculate) of participants in in vitro (test tube) fertilization programs in 6 Canadian cities

#### SATURDAY DISCUSSION

- What are the public's concerns regarding reproduction, fertility, and toxic chemicals?
- How can researchers improve the public's participation in studies to evaluate pregnancy loss or infertility which may be caused by chemicals?
- Other related issues you may wish to address.

*\*Toxicology is the scientific study of chemicals which may cause harm to humans, animals, or other living things.*

*\*\*Reproductive toxicity is the potential of a chemical to interfere with normal reproduction.*

## GREAT LAKES NATIVE HEALTH EFFECTS STUDY

### GOAL

Assess the extent of exposure of the Native people living in the Great Lakes Basin to environmental contaminants and the risk to health which this exposure entails.

### STUDY COMPONENTS

- Native/Government partnership and a strong community base.
- Development of laboratory to respond to the needs of a community based study.
- Study design with both scientific and community input.

### FUNDING

- Bridge funding from GLHEP
- On going funding from Green Plan.

### STATUS

- Partnership with Assembly of First Nations (AFN) established.
- Community consultations: First round completed. Second round about to start.
- Laboratory development underway.
- Scientific components, including Epidemiology/Biostatistics (U of T) now being developed.
- Steering Committee with community representation now established.
- Scientific advisory committee being set up.
- Bibliography research completed.
- Detailed goals and objectives was now drafted.

# Great Lakes Health Effects Cohort Study

## Health and Welfare Canada

May, 1991

### Purpose

The Great Lakes Health Effects Cohort Study is a multi-phase project designed to investigate the relationships between human exposure to contaminants found in the Great Lakes (through the consumption of contaminated fish and wildlife) and a variety of human health endpoints. This study focuses on residents of Ontario who are not of native origin. A separate study is being developed by native communities and the Department to address similar issues and associations for native people in Ontario.

### Phase I

The basic sampling frame for the study has been created during this phase. It consists of individuals who purchased a 1988 resident sport-fishing license. This group is assumed to have a higher likelihood of relevant exposure (i.e. consumption of Great Lakes fish and wildlife) than the rest of the population. Resident sport-fishing licenses are sold to non-native Ontario residents who are between 18 and 64 years old.

### Phase II

The purpose of this phase is to identify a cohort of households for further health effect studies. This phase will furnish essential information on the population potentially at risk through a mail-out "screening" questionnaire, i.e. Great Lakes Basin Anglers Survey.

#### Specific activities include:

- |  |  |
|--|--|
| <b>Pre-test</b>                        | <ul style="list-style-type: none"><li>• refinement of the "screening" questionnaire using small focus groups of randomly selected participants (completed March/91)</li></ul>  |
| <b>Pilot study</b>                     | <ul style="list-style-type: none"><li>• a mail-out "screening" survey of about 5000 households to allow assessment of response rates and different sampling strategies for the main Phase II survey. The Pilot study (currently ongoing) will also provide a sample of individuals for the Pilot Exposure Assessment Study</li></ul>   |
| <b>Pilot Exposure Assessment Study</b> | <ul style="list-style-type: none"><li>• a study of 100-200 individuals (starting in the winter 1991/92) to</li><li>• assess the distribution of contaminants found in tissues/fluids (ie. blood, hair) of people consuming fish and wildlife</li><li>• clarify the relationship between reported consumption (in a detailed dietary questionnaire) and measured contaminant levels in tissues/fluids</li><li>• establish the feasibility of conducting health effects studies and more intensive exposure studies</li><li>• identify population sub-groups potentially at high risk of exposure to elevated levels of contaminants</li></ul> |
| <b>Main Survey</b>                     | <ul style="list-style-type: none"><li>• using the "screening" questionnaire for the Great Lakes Basin Anglers Survey, identify households for further health effect studies</li></ul>  |

### Phase III

This phase will involve exposure assessment and health effect studies investigating the relationships between consumption of Great Lakes fish and wildlife and selected health outcomes, while controlling for the potential confounding effects of socio-demographic, lifestyle, environmental and occupational factors. Health outcomes may include immunological, developmental, and reproductive endpoints. An expert planning workshop was held in March, 1991 and a report of the meeting is available.

### Public consultation and communication

The study is being conducted in consultation with individuals, public interest groups, industry, other government agencies and scientific experts. The project coordinators are committed to providing the public with information about the study and its results.



**Great Lakes Health Effects Cohort Study**  
**Health and Welfare Canada**

May, 1991

The Great Lakes Health Effects Cohort Study is a multi-phase project being conducted by Health and Welfare Canada to investigate the relationships between human exposure to the contaminants found in the Great Lakes basin and the risk of a variety of adverse health effects. Elevated levels of contaminants in the Great Lakes basin may pose a threat to health but the precise nature and extent of the threat is unclear. Fish and wildlife exposed to mixtures of contaminants in the Great Lakes basin accumulate these substances within their bodies. Residents of the basin consuming large quantities of contaminated fish and wildlife may have greater exposure to these contaminants. This study will examine the extent and nature of the risk of eating contaminated fish and wildlife and will identify high risk populations.

The Great Lakes Basin Anglers Survey is part of the Great Lakes Health Effects Cohort Study. The survey will characterise the consumption of fish and wildlife through a brief questionnaire mailed to randomly selected Ontario residents who purchased a sport fishing license in 1988. Further phases of the Cohort Study will look at the relationship between exposure and specific health effects.

The questionnaire and methodology for the Great Lakes Basin Anglers Survey is currently being tested on a small sample of licence holders (1,000 households) across Ontario with emphasis in the Great Lakes basin. This summer and fall, the pilot study will be expanded by 4,000 households with further sampling in the Great Lakes basin. From this pilot survey, 100 to 200 participants will be asked to provide blood and hair samples for contaminant analysis and to complete a detailed dietary questionnaire. This will provide information on the range and levels of contaminants found in humans consuming large quantities of Great Lakes fish and wildlife. The main questionnaire survey is expected to be conducted in 1992/93. This survey will provide the basis for selecting participants for further in-depth health effects studies. These studies will investigate the relationships between consumption of Great Lakes fish and wildlife and selected health outcomes, while controlling for the potential confounding effects of socio-demographic, lifestyle, environmental and occupational factors.

The study is being conducted in consultation with individuals, public interest groups, industry, other government agencies and scientific experts. The project coordinators are committed to providing the public with information about the study and its results. For more information on this project and the Great Lakes Health Effects Program, please contact:

Deborah Jordan-Simpson  
Great Lakes Health Effects Cohort Study  
Laboratory Centre for Disease Control  
Health and Welfare Canada  
Room 5C, Health Protection Building  
Tunney's Pasture  
Ottawa, Ontario K1A 0L2

Telephone (613) 954-6363  
FAX (613) 952-7767

# Getting People to Volunteer for Tissue (blood, urine) Sampling & Surveys

## Case Study - Pilot Exposure Assessment Study

Workshop Topic  
Jackson's Point, Lake Simcoe  
July 19-20, 1991

### Background Information

#### *Study Objectives*

- Assess the distribution of contaminants found in blood and hair of people consuming contaminated fish and wildlife
- Examine relationship between fish and wildlife consumption reported in a detailed dietary questionnaire, and measured contaminant levels in blood/hair
- Examine relationships between measured biological responses ("biomarkers" such as urine enzymes, caffeine metabolism, enzyme receptors) and measured contaminant levels in blood/hair
- Establish feasibility of conducting health effects studies and more intensive exposure studies on population groups exposed to contaminants
- Identify population sub-groups potentially at high risk of exposure to elevated levels of contaminants

#### *Proposed Methods*

Work in the community primarily with local medical officer of health, public health unit, local fish and game clubs and RAP/PAC teams if applicable.

Solicit participation by:

- (1) introductory letter (explanation of study, consent form)
- (2) phone follow-up
- (3) other information via local media, club newsletters

For pilot study approximately 200 volunteers will be asked to:

- (1) come to "clinic" in early morning after overnight fast (no food or caffeine since previous dinner), no fish for previous 48 hours
- (2) bring in urine sample (1st morning void, in provided container)
- (3) give a blood sample (1/8 - 1/2 of regular blood donor amounts)
- (4) give a hair sample
- (5) complete a dietary questionnaire administered by a trained interviewer

- (6) possibly take a "caffeine breath test" to look at caffeine metabolism; this involves consuming a glass of  $^{13}\text{C}$ -labelled caffeine (Coke) and after 1-2 hours providing a breath sample (to be measured for metabolites) ( $^{13}\text{C}$  is a normal component of organic compounds, but occurs only in small amounts in natural products).

### *Results*

- Individual results on contaminant levels and "biomarker" values will be provided to physician of volunteer's choice, with information on interpretation
- Summary of overall study results will be provided to everybody who participated in the clinical tests

### Issues

- Individual results may take many months; study results and summary will take additional time to produce.
- Tests are very expensive (PCB congener analyses 800\$/sample). We want to maximize information from each volunteer. Therefore it is important to have volunteers participate in every component of the study.
- We are in a predicament of being able to quantify the levels of contaminants without necessarily knowing if any particular level poses a health risk; this is also true of the "biomarker" tests.

### Questions for Working Group

1. How will people react to what we have planned? What aspects do we need to work on?
2. How do we get volunteers to participate? How do we meet both their needs, and the scientific needs of the study? For example,
  - initial information and request to participate
  - community/club meetings, media contacts etc.
  - logistics at time of sampling - facility, staff, information
  - study results - presentation, interpretation etc.
3. How do we handle the fact that we can give quantitative information on volunteers' blood/hair contaminant level or measure of biological response (biomarkers) but we cannot advise them on the health risk associated with those values?

## **APPENDIX B**

### **Attendees**

#### **Workshop Participants**

Dr. Barry Adams, Canadian Paediatric Society

Ruth Bacon, La Leche League

Lynne Bankert (Facilitator), Dispute Settlement Center, Buffalo, New York

Dr. Rosalie Bertell, International Inst. Concern for Public Health

Malcolm Boyd, Director of Planning Lambton County

Fred Brown, Great Lakes United

Jonathan Burns, Grade 12 student

Dr. Harry Cieslar

Chris Clark, Environment North

Rick Coronado, Windsor District Labour Council

Alan Craig, United Church of Canada

Valorie Cromie, Niagara River RAP

Dave Dodgson, Bay of Quinte RAP

Gaye Gardiner-Nielson, Parent, Women's Group Representative

Dave Gibson, Ontario Federation of Anglers and Hunters

Mary Ginnebaugh, Great Lakes United

Dr. Chris Greensmith, Lambton County Board of Health

Jeanne Jabanoski, Environmental Protection Office Toronto, Ontario

John Jackson, Great Lakes United

Shaheem Kassin-Lakha, Environmental Protection Office, Toronto, Ontario

Art Knowles, Seniors for Social Responsibility

Louise Knox, Environment Canada Ontario Region

Dick Kubiak, Erie County Environmental Coalition

Henry Lickers, Mohawks Agree on Safe Health

Jim Martin (Facilitator), Metro Toronto RAP

Maurice Martin, Ontario Soil and Crop Improvement Association

Fred McGregor, Assembly of First Nations

Sarah Miller, Great Lakes United

Carole Mills, Assembly of First Nations

Laurie Montour, Assembly of First Nations

Dr. Evert Nieboer, McMaster University, Health Science Center

John Perks, Ontario Fish Producers Association

Pat Potter, Environmental Hazards Team

Alejandra Priego, Multicultural Health Coalition and Access Alliance

Moira Romano, Education Through Video

Susan Rupert, APT Environment

David Stringer, Image North

Fran and Larry Thorne, F. O. Cottagers Association

Phil Weller, Great Lakes United

## **Health and Welfare Canada Attendees**

Mary Hegan, Great Lakes Health Effects Program

Andy Gilman, Great Lakes Health Effects Program

Rick Burnett

Warren G. Foster

Don Grant

Bob Hills

Deborah Jordan-Simpson

Jill Kearney

Cheryl Makowsky

Janine Turnbull

## REPORT TO PUBLIC CONSULTATION WORKSHOP LAKE SIMCOE, 1991

### Great Lakes Health Effects Program, Health and Welfare Canada

#### REPORT CARD: A RESPONSE TO RECOMMENDATIONS FROM 1990 WORKSHOP

A series of recommendations to Health and Welfare Canada were listed throughout the 1990 Workshop report, *Human Health Effects from Toxic Chemicals in the Great Lakes*.

The following notes summarize the recommendations in the left column, and the right column lists some of the actions taken by HWC in the past year. It is impossible to list all actions by the Department, therefore mainly actions taken by GLHEP are noted.

#### RECOMMENDATIONS TO HEALTH & WELFARE CANADA FROM 1990 PUBLIC WORKSHOP

##### ROLE

- \* The role emphasis for HWC should be on:
  - health and/or environmental research
  - prevention policies
  - public education and communication
  - personal protection guidelines
- \* Regulate and enforce laws more
- \* Act as a coordinating body among various sectors and bodies
- \* Focus \$ on problem(s) faced by the population groups most at risk

#### ACTIONS TAKEN BY HEALTH & WELFARE CANADA 1990-1991

- Work has focused on health/environment research (toxicological effects and tissue analyses). GLHEP supports Federal pollution prevention initiative, public education and communication, and consistent guidelines.
- Actions are being taken through the Canadian Environmental Protection Act (CEPA).
- Being an inter-directorate and inter-branch program, GLHEP is continually coordinating and communicating within the dept, with other depts, with the province, and has established partnerships with several NGOs and publics. Also set up Can-U.S. Health Issues coordination process.
- Biological Markers project, Fish Contaminant Intake Study, First Nations Exposure Study, and Ontario Fish Consumer Cohort Study will help in identifying sensitive individuals.

- \* Set a national agenda for health-related environmental issues, including:
  - ensure public review and environmental assessment of all environmental-health related policies and programs
  - review all existing policies and programs from the environmental-health perspective
  - improve the linkage between environmental health effects and regulatory initiatives

### RESEARCH

- \* Coordinating role for HWC on research in terms of standardized methodologies, info exchanges (a centralized clearinghouse) and activity coordination
- \* Facilitate increased involvement of the public health sector
- \* Non-traditional approaches to scientific studies (17 ideas on p.4 of 1990 Workshop report)
- \* variety of research needs (19 ideas on p.8 of 1990 Workshop report)

### PREVENTION

- \* reduction of toxics in the environment and zero discharge of persistent toxics
- \* environmental audit requirement of industry

- Health, and the work of HWC, is playing a greater role in environmental assessments, RAP studies, legislation addressing contaminants (i.e. CEPA). Much depends on public pressure to do so.

- GLHEP is involved in the Can-U.S. development of human health indicators for the ecosystem objectives, IJC committees that review research needs, and the inter-agency Great Lakes Action Plan. GLHEP coordinates 30 projects within HWC.
- GLHEP staff have been involved in mtgs with public health units, Association of Local Official Health Agencies(ALOHA), Ontario Ministry of Health, and Ontario College of Family Physicians to promote health/ environment links.
- The Native Peoples Study has taken, and the Ontario Cohort Study will take, a community-oriented approach. Completed a study on participatory action research and its relationship to GLHEP.
- Refer to the two GLHEP project handouts for details on how GLHEP's research projects are addressing the variety of research needs raised in 1990.

- HWC supports "zero discharge". Zero means *no new additions*.
- The Province of Ontario is at work doing this and Dept of the Environment (DOE) is concentrating on the auto industry under the Prevention Unit.



- \* shift burden of proof towards proving safety, rather than harm, of new chemicals
- \* clean-up of existing environmental pollutants
- \* development of an Environmental Health Screening Program (EHSP) to evaluate planning and construction of new developments

**Food**

- \* virtual elimination of persistent toxics from food sources
- \* stringent food standards with public input on any changes

**Education**

- \* scientists and health professionals should be trained in environmental health issues and how to communicate in lay language
- \* production of brochures for the public

**Risk Assessment**

- \* involve public and health professionals in risk assessment

- This is CEPA's main approach for *all* new chemicals
- GLHEP involvement in Remedial Action Plans (RAPs) includes health advice on the clean-up strategies in the Areas of Concern (AOCs). DOE has a Clean-up Fund.
- Federal Environmental Assessment and Review Process (EARP) has been accelerated but does not have a specific EHSP. Health is being included more and more in RAPs.
- The use of persistent toxic pesticides (such as DDT, Dieldrin, Toxaphene) is no longer permitted, but residues do remain and toxic contaminant residues can come from other sources. Chemical residue analysis is ongoing.
- All food standards are developed for the protection of human health. Any changes to standards, as a result of new knowledge or analytical techniques, are subject to public review through part 1 of the Canada Gazette process.
- One of GLHEP's new projects is to provide staff workshops, info sessions, consultation meetings, newsletter, and meet-the-public events to assist govt scientists to communicate, collaborate, and consult with the public more effectively.
- GLHEP helps distribute materials throughout the Great Lakes basin and contributes ideas for the preparation of new brochures. GLHEP also has produced and is producing material for distribution.
- Various publics are being consulted in research studies which are being designed by GLHEP to assess health risks.

## WORKING WITH THE PUBLIC

- \* HWC should develop a formal Public Consultation Policy; all decisions should be guided by this policy
- \* communicate the urgency of the human health and environmental contamination problem
- \* establish an educational advisory group
- \* establish a community-based info referral service
- \* involve public in all aspects of programs
- \* listen to and use public in decision-making
- \* HWC as "Environmental Health Communicator"
- \* involve public in and give easy access to all aspects of the decision-making process

### **Types of Consultation**

- \* **One-Way** - HWC should use a variety of communication techniques which are empowering, understandable, promptly released, and use existing distribution systems
  - e.g. - booth at NGO conferences
  - human health info to the press

- A Public Participation Strategy, including Public Consultation Projects, has been developed for GLHEP.
- This is being done by GLHEP through handouts, partnership productions (e.g. video) and special presentations.
- Planning is underway for a teachers' advisory task force in the 1991-1992 fiscal year.
- GLHEP presently has a system to provide some community health data on request.
- Annual consultations and External Advisory Committee
- GLHEP gets advice from its External Advisory Committee, attends meetings and conferences of groups and organizations to reach out to and hear from various publics, and encourages the development of govt/public partnerships.
- Many of HWC's programs, including GLHEP, are communicating the link between health and environment.
- GLHEP Advisory Committee is involved in two-day staff planning meetings
- GLHEP staff have set up displays at several conferences, including: GLU Annual Mtg., IAGLR, ALOHA
- Health Protection Branch (HPB) Issues documents, backgrounders, GLHEP mtg. in August with Science Writers

- provide names of contact people and available resources

\* **Two-Way-** e.g.- establish Public Advisory Committee

- develop networks with various publics

- conduct local public hearings to discuss issues / concerns

- ensure full consideration of and response to public input

\* People need accurate, specific info in order to protect themselves from the pollutants in the Great Lakes (specific info needs on p.14 of 1990 Workshop report).

- GLHEP is financing the development of lake-wide health and environmental networks throughout the basin and is distributing the *Health and Environment Audio-Visual Catalogue*
- established in July 1990
- funding NGOs to develop networks around each Great Lake and GLHEP is part of the networks
- GLHEP staff participates in community "Town Hall" meetings to address local health and environmental concerns.
- This is achieved through GLHEP's Public Participation Strategy.
- Toxic Chemicals Report, March 1991, summarizes health findings to date. HPB *Issues* papers provide specific info and advice on certain chemicals and other health/environment topics.

## COMMUNITY BASED HEALTH INFORMATION FOR THE GREAT LAKES BASIN

People are concerned that toxic chemicals in the environment can affect their health and the health of their communities. One component of the Great Lakes Health Effects Program involves epidemiological studies (studies of disease patterns in humans) to ascertain whether living in the Great Lakes Basin affects the health of the residents.

The health outcomes that are being studied in some of GLHEP's epidemiological projects include rates of mortality (death), morbidity (illness), cancer incidence and birth defects, all at the community (census subdivision) level. The data will be analyzed by creating maps of the rates for the geographic regions. These maps can then be used to identify communities with high incidences of adverse health outcomes, to identify spatial trends, and to compare communities within the basin to each other and to the Ontario average. These studies will also trigger the interest of researchers to do more in-depth studies of individual communities.

The presentation of the information generated from these epidemiological studies will be in the form of a cancer incidence, morbidity and birth defect *atlas*.

### THE ISSUES

- How can this community based health information best be presented so that it is useful and understandable to communities and residents in the Great Lakes Basin?
- How should this information be presented in order to prevent instilling fear in residents of high incidence communities?
- How should this information be related to exposure to environmental contaminants?
- Should this data be interpreted by local health professionals for communication to the residents? What role would the media play?

*Presentation by Dr. Rick Burnett, July 1991*

The Bureau of Chemical Safety, Food Directorate, Health Protection Branch has a number of projects under the Great Lakes Health Effects Program. A very brief description of these follows:

### Contaminants in Fish

Previous work on Herring gull eggs from Lake Ontario indicated that samples from some sources had organochlorine levels 2-3 times higher than could be accounted for by known compounds. A more recent Japanese study showed that in fish and human tissue, known compounds constituted only a small portion (1-20%) of the total organochlorines. Since fish can be a major source of exposure of humans to such compounds, it was considered of importance to assess the situation in fish which are consumed by humans in the Great Lakes Basin.

The analysis of seventy five commercial fish fillets from the Great Lakes has now been completed for known organochlorine residues (PCBs, OCs, Toxaphene etc) and for total organochlorines. Total organochlorines were determined by neutron activation (Contract-Dalhousie University).

The results were compatible with the Japanese data and indicated that > 75% unknown organochlorine compounds were present in most cases. These unknown organochlorine compounds were for the most part of a more polar nature than the known ones.

Currently attempts are underway to identify these unknowns and to get a preliminary indication of their toxicity (if any) through some short term enzyme bioassays.

### Chemical Contaminant Intakes

Projects are structured to look at the potential contaminant intakes and subsequent body burdens of residents of the Great Lakes Basin. Fish has been identified as the principle source of contaminant intake, and as a result a database is being constructed that will assimilate fish contaminant data from monitoring programs and those reported in the literature. This database will be comprised of past and current data and will be updated as new data becomes available on existing and emerging contaminants found in Great Lakes Basin fish. It is intended that the database be further expanded to include contaminant data from other foods, including country or wild foods. The information in the database will be used in conjunction with known and yet to be determined food consumption patterns for residents, dependent on or who utilize the natural resources of the Basin as a food source, as well as the typical Basin resident. Models of exposure will be constructed and used to predict human exposure profiles for Basin residents, based on the foods consumed. These predictions will identify specific sites and residents that have the greatest exposure and the greatest potential for the development of adverse health effects associated with intake of contaminants from foods. Subsequent analysis of the health assessments, in relation to the contaminant profile developed for Basin residents, will be used to ensure that any contaminant limits or guidelines for foods are sufficient to protect against the potential for adverse health effects.

## Toxicity Profiles

Many jurisdictions have identified large numbers of contaminants in the waters/sediments/biological materials of the Great Lakes, especially Lake Ontario. The occurrence and potential effects that exposure to these contaminants could have on human health is a concern. To address these concerns it is necessary to develop profiles of the toxicology of each contaminant. These profiles include reported human health effects, results from animal toxicity studies, chemistry and occurrence and exposure data. Gaps in the information base will be identified and a priority of concern can be established. This will be used in determining which contaminants pose the greatest potential hazard and have highest priority for remedial action.

Toxicology databases have been reviewed and screened for information on contaminants identified as present in the Great Lakes, especially those known to be found in fish. These databases include EPA, WHO (IPCS), Environment Canada, Health and Welfare Canada and commercial sources. The acquisition of a LAN (local area network), to be used as the central system for data acquisition and storage, is in the final stages. The LAN will connect with electronic databases and both national and international information systems, e.g. Citation Abstracts, IPCS, and will enhance the accessibility of current information for inclusion in the decision making process on contaminants. Current work centres on assessing the quality of the information in each database for the priority contaminants.

## Multigeneration Reproduction Study.

Recent publications on several chemicals identified as contaminants in fish from the Great Lakes have reported adverse effects on reproduction, immune system and development as key public concerns. A multigeneration rat toxicity study concentrating on reproduction, teratology, immunology and developmental toxicity (behavioral toxicity) has been initiated. Chinook salmon from Lake Ontario and Lake Huron will be used as the test material, and fed to rats at levels equivalent to approximately 300 times the estimated average human daily consumption of fish. Unlike studies with single chemicals, this study will provide information for evaluating the human health hazard from the consumption of fish containing the whole gamut of chemical contaminants. Also, the results will be used to refine the approaches for any future human health effects study which may be conducted.

Investigators have been identified for each of the components of the multigeneration study. Initial protocols have been designed for each module, and are currently under review by the investigators. The Ontario Ministry of Natural Resources have graciously agreed to supply fish from each lake to be used in the study, and arrangements have been made with Guelph University and Purina Inc. to incorporate this fish into rat chow. Only the portion of the fish that would be consumed by human populations is to be used. The multigeneration study is scheduled to begin about December 1991, and initial results should be available in late 1992.

## Biomarkers

Human epidemiological investigations with a variety of the Great Lakes priority contaminants have shown that with exposure, the possibility of long term adverse health consequences may exist. As human exposure to these contaminants is inevitable (food consumption), it would be advantageous to have early biological indicators of exposure to supplement and assist exposure assessment information.

### I. Caffeine Breath Test (CBT)

The majority of Great Lakes organochlorine contaminants increase the activity of various groups of hepatic drug-detoxifying enzymes in a dose-dependent manner. As these same enzymes are also involved in the initial stages of caffeine metabolism, a non-invasive system for correlating the rate of caffeine clearance to liver enzyme activities would be advantageous.

Human cohorts exposed to a variety of xenobiotics (cigarette smoke, PBBs, PCBs/PCDFs, mirex) have shown increased rates of caffeine metabolism as detected by the CBT. Generally, there has been an association made with the higher rates of caffeine metabolism and exposure to contaminants which are potentially more toxic. This agrees with the hypothesis that the greater a chemical's ability to induce aryl hydrocarbon hydroxylase (AHH) detoxifying enzymes, the greater its toxic potential.

### II. Urinary Porphyrin Analysis

One of the rate-limiting enzymes involved in hemoglobin synthesis, uroporphyrinogen decarboxylase (UROD), has experimentally been shown to be sensitive to a variety of contaminants found in the Great Lakes (PCBs/PCDFs, dioxin, HCB). As UROD activity decreases, a variety of hemoglobin precursors, porphyrins, accumulate and are excreted in the urine and feces. This clinical condition, termed porphyria, has been shown to occur in the absence of any other symptoms. Prior studies with humans who have been inadvertently exposed to these compounds have detected abnormal transient urinary porphyrin profiles. Also, experimentally, it has recently been demonstrated that the magnitude of the response to these porphyria-inducing chemicals may be an indication of the overall toxicological sensitivity towards a wide variety of halogenated contaminants which interact with the Ah receptor.

Contracts to further investigate the utility of these two biomarkers have been initiated.

## Ah Receptors

The toxicity of a variety of Great Lakes pollutants, including dioxins and PCBs, is dependent upon the presence of a specific aromatic hydrocarbon (Ah) protein "receptor". Previous experimental studies have shown that the severity of the toxicological response is controlled by the quantity and pollutant-binding characteristics of this receptor. Currently, although this receptor has been detected in numerous human tissues (lung, liver, blood cells etc.), there have been no population distribution patterns established. As a higher receptor quantity could

possibly result in an increased risk of toxicity from these chemicals, this project will attempt to define the distribution and binding characteristics of the Ah receptor in a human tissue representative of a fetus, the placenta.

Currently, 80 human placentas have been analyzed for their Ah receptor binding characteristics. It appears that all placental samples contain detectable receptor quantities but there is some variation in the affinity (binding strength) of dioxin for the receptor. It has been hypothesized that those individuals with receptors having higher binding affinities would be at increased risk from these pollutants. Further sample analysis is planned to correlate adverse pregnancy outcomes to the Ah receptor data. Selected placentas will be analysed for chemical residues.





**GREAT LAKES UNITED**

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**FOLLOW-UP  
GREAT LAKES HEALTH EFFECTS  
PUBLIC PARTICIPATION WORKSHOP  
JULY 19-20, 1991**

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**FRIDAY, JULY 19**

**2:00 pm - 9:30 pm**

**2:00 - 2:15**

**Opening Introduction and Welcome**

**2:15 - 3:15**

**Revisiting the 1990 Workshop Recommendations  
(Blue Book)**

**3:15 - 3:30**

**Break**

**3:30 - 5:30**

**Presentations and Questions on the Great Lakes  
Health Effects Program (GLHEP) Projects**

- \* Foods**
- \* Reproductive Toxicology**
- \* Mapping Community Health Information**
- \* A Cohort Study of Fish & Wildlife Consumers**
- \* Native Study**

**5:30 - 6:30**

**Swim and Relaxation**

**6:30 - 7:30**

**Dinner**

**7:30 - 9:30**

**Film Presentation and Discussion  
"The Great Lakes People"**

**9:30**

**Free Time**

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(716) 886-0142  
Canadian Address: P.O. Box 548 Station A • Windsor, Ontario N9A 6M6

SATURDAY, JULY 20, 1991 8:30 am - 5:30 pm

7:30 - 8:30	Breakfast
8:30 - 10:00	Workshops - "Future Research Directions and Needs" - Four groups of 10
10:00 - 10:30	Break & Visit Displays
10:30 - 12:30	Workshop - "Community-Based Health Actions" - Four groups of 10 <ol style="list-style-type: none"><li>1. Presenting Health Information and Advice for Communities</li><li>2. Methodology for Assessing Community Health</li><li>3. Local Health Advisers and Planners - Working With Senior Levels of Government</li><li>4. Actions for Protection of High Risk Groups</li></ol>
12:30 - 2:00	Lunch & Break
2:00 - 2:45	Report Back from Morning Workshops
2:45 - 3:00	Break
3:00 - 4:30	Workshop "Relationship of Health Effects Program Research to Other Government and Non-government Programs" - Four Groups of 10.
4:30 - 5:30	Final Plenary, Wrap-up