

**Human Health and the Great Lakes
Water Quality Agreement**

Final Report by the International Joint Commission's
Ad-Hoc Health Advisory Group

FEBRUARY 14, 2006

Introduction

The Co-chairs of the Health Professionals Task Force and the Science Advisory Board's Work Group on Ecosystem Health met in Chicago in March 2005 to consider ways to assist the Commission in its review of the Great Lakes Water Quality Agreement (the Agreement) with respect to human health. Following this meeting, the Agreement Boards, the Council, the International Air Quality Advisory Board and the Health Professionals Task Force were solicited for their interest in forming an ad-hoc Health Advisory Group (HAG). A draft Terms of Reference for the Group was included as a starting point for future discussions (Appendix 1).

Prior to the first meeting of the HAG, held in Kingston, Ontario, the members were provided with the background documents listed in Appendix 2. At the Kingston meeting, the HAG adopted the Terms of Reference and proposed a set of questions to further solicit comments from its membership on the role of health and the Agreement (Appendix 3).

The HAG membership developed the following general and specific comments with respect to the characterization of human health in the existing Agreement and identified needs to enhance human health considerations in any future revision of the Agreement.

The Existing Agreement

The HAG's review noted the use of the words "health", "human", "human health" and "health of humans" in Annexes 2, 12, 17 and Articles I(g), III within the existing Agreement. However, the existing references to human health are insufficient to address the specific human health effects or concerns for the citizens living in the basin. The Agreement hints at these connections but it does not fully address the concerns about human health effects (i.e. carcinogenic, cardiovascular, reproductive, neurotoxic, immunotoxic, developmental and endocrine disruption) that are associated with known environmental stressors within the Great Lakes basin. Furthermore, given the Agreement's lack of specificity to human health in its fundamental Articles (i.e. I and II) the Parties often find it difficult to justify research agendas that specifically address the risks to human health posed by environmental degradation.

The prime directive of the Agreement "to restore and maintain the chemical, physical and biological integrity of the water of the Great Lakes basin" is no longer accurate as the basin ecosystem is rapidly changing under a number of environmental stressors derived from human activities that make the Agreement's concept of "restore" difficult to achieve. Climate change, urban and rural development, and invasive species are just some of the new-found stressors that are hampering restoration efforts. Any future Agreement should be focused on a healthy ecosystem that supports healthy communities for not only humans, but for fish and wildlife as well.

The existing Agreement takes an ecosystem approach that inherently lends itself to multiple interpretations and disagreement about the specificity human health concerns need to be considered. A framework is needed, in any future agreement, that explicitly includes clear definitions of health measures (i.e. using modern terms like “bio-monitoring”, “human health surveillance”, and “burden of illness”) to aid research and surveillance and linked to action items with tangible benchmarks.

General Comments for a Revised Agreement

Members concluded that for environment and human health linkages to become explicit in a revised Agreement a definition of “health” and/or “human health” would be required. A definition of “human health” could be derived from that of the World Health Organization, Health Canada or Agency for Toxic Substances and Disease Registry. Further, to avoid an overly-prescribed narrow focus, a broader definition of “health” for the Great Lakes that does not differentiate between the health of wildlife and humans needs to be included. Such a definition should recognize the most vulnerable populations. A clear differentiation in the definition of “health” and/or “human health” would help to identify the health science gaps in Great Lakes research and thereby set the stage, scope and context for the Agreement’s specific objectives and in turn assist the Parties in setting their environmental health priorities.

A revised Agreement should include a requirement for public outreach and education. It should require health status input into LAMPs and RAPs that covers both what is known and what is not known. As well the health status input should identify, where possible, those health outcomes that have an environmental contribution to the burden of illness. The public needs to better understand the difference between individual health outcomes and burden of illness in a population. A clear statement that the environment is linked to one’s personal health and that one’s actions toward the environment are linked to the health benefits for a population must be articulated in a revised agreement.

The existing Agreement primarily focuses on water. This must be augmented to include recognition of the impact of other pathways of exposure. In the future to examine and reduce exposures to toxic substances released or deposited in or at the shores of the Great Lakes, the agreement must include air, soil and sediment, and food. Integrated approaches such as population health or ecosystem health must also be embraced in a multi-pathway framework for the agreement, and action provided to address the impact from each pathway.

Specific Comments for a Revised Agreement

The HAG Recommends

Article I – Definitions

Under the Definitions as used in this Agreement: Add definitions for

- "Health"- is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO, 1948)^{1,2}
- “Ecosystem Health” – is a lack of contamination and absence of disease in all components of the ecosystem, including all flora and fauna.³
- “Human Health” is the absence of disease in humans from a variety of stressors including toxicants resulting from contamination of the Great Lakes ecosystem.⁴
- "Microbial contamination" means contamination of water or sediments with bacteria, viruses and/or parasites.⁵
- "Multimedia exposure" means single or multi-route exposure to pollutants found in and released through multiple pathways, such as through diet, drinking water, consumption of fish and wildlife, inhalation, and dermal absorption through the skin. Additionally, modify the definition for toxic substances to make sure it covers (articulates) multimedia cumulative exposure.

¹ Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.

² Reviewer Comments: This WHO definition contradicts the definition of “human health” provided since the WHO definition emphasizes that “health is.....not merely the absence of disease”. The definition for human health should be retained since it is consistent with the GLWQA General Objectives (i.e. Article III(d) given the WHO definition is probably out of context.

³ Reviewer Comments: Took issue with “when does a healthy ecosystem not have disease”. May wish to consider the following definition provided in the 2003-2005 GLWQA Priorities Report. Ecosystem Health – a physique of an ecosystem. A healthy ecosystem is stable and diverse, resilient and resistant to environmental changes and resource stresses, characterized by a state of dynamic equilibrium in its composition, structure and functions, good intact maintenance of its physical, chemical, and biological components and their interrelationships for biological diversity and ecological integrity over time, and providing abundant and beneficial services to its constituents, such as food, water, shelter, economic livelihood, recreation, and natural beauty.

⁴ Reviewers Comments: (1) No need to define it. What we want to ensure is that whatever the existing burden of illness in populations in the Great Lakes Basin Ecosystem, it is not increased by contaminant exposure and whatever other stressors you think are fair game for mitigation within the Agreement. (2) Terms like toxicants, pollutants and contaminants are used interchangeable. It was suggested the term “pollutant” be used as a short form for “Hazardous polluting substance as defined in Article 1(i) although the definition of latter should be modified to include “harmful microorganisms”.

⁵ Reviewers Comments: This definition is not appropriate because water/sediments are not sterile and contain rich microbial life. It was suggested the term microbial pollution be used with the definition as “pollution of water or sediments with bacteria, viruses and/or parasites that are harmful to human health” to be consistent with the existing Specific Objectives in Annex 1(iii) – Microbiological.

Under (g) “Great Lakes Basin Ecosystem” means the interacting components of air, land water and living organisms, including humans, with the drainage basin.... between Canada and the United States.

Modified statement under (g):

- to mean all of the Great Lakes and the land mass that drains into the Great Lakes and includes the waters, soils and sediment, plants, fish, wildlife and humans that constitute and/or inhabit this whole area.
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Article II – Purpose

Under the Agreement’s Purpose: The purpose of the Parties is to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem. In order to achieve this purpose, the Parties agree to make a maximum effort to develop programs, practices and technology necessary for a better understanding of the Great Lakes Basin Ecosystem and to eliminate or reduce to the maximum extent practicable the discharge of pollutants into the Great Lakes System.

Revise this statement under Purpose:

- In order to achieve this purpose, the Parties agree to make a maximum effort to develop programs, practices and technology necessary for a better understanding of the Great Lakes Basin ecosystem and to eliminate anthropogenic stressors that impair human health and the natural functioning and structure of the ecosystem.

Add a statement to the policies of the Parties that:

- The Parties work to reduce/eliminate emissions that lead to air transport of toxic substances from sources distant from the Great Lakes Basin into the Great Lakes, and also to reduce/eliminate emissions that lead to air transport of toxic substances from the Great Lakes.
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Article III – General Objectives

Under the Agreements General Objectives (d): Free from materials and heat directly or indirectly entering the water as a result of human activity alone, or in combination with other materials, will produce conditions that are toxic or harmful to human, animal, or aquatic life.

Revise statement (d):

- to reflect microbial concerns and replace the word “materials” with the word organisms, “chemicals”.
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Article IV-Specific Objectives

Under Objective 3: The Parties shall consult on:

Add statement(c):

- The impact of Great Lakes pollutants on health of residents of the Great Lakes Basin.
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Article VI – Programs and other Measures

Under the Agreement’s Airborne Toxic Substances (1l) Programs to identify pollutant sources and relative source contribution, including.....through atmospheric deposition in drainage basins.

Add the first sentence add this statement

- Programs to identify the pollutants and relative contribution of air-borne pollutants coming from the Lakes which may impact the health of the human population of the Great Lakes basin

Modify the existing second sentence to include:

- In cases where significant contributions to Great Lakes pollution from atmospheric sources are identified, or when significant releases of toxic substance from the Great Lakes are found, the Parties agree to consult on appropriate remedial programs.
- **Under the Agreement’s Surveillance and Monitoring(1m):** Implementation of a coordinated surveillance and monitoring program in the Great Lakes System, in accordance with Annex 11, to assess compliance with pollution control requirements and achievement of the Objectives, to provide information for measuring local and whole lake response to control measures, to identify emerging problems.

Revise statement (1m) to include:

- Implementation of a coordinated surveillance and monitoring program in the Great Lakes System, in accordance with Annex 11, to assess compliance with pollution control requirements and achievement of the Objectives, to provide information for measuring local and whole lake response to control measures, to identify emerging problems *and to monitor the health effects in fish, wildlife and human populations in the Great Lakes Basin for environmentally-induced effects.*
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Annexes

Annex 1 – Specific Objectives

These Objectives are based on available information on cause/effect relationships between pollutants These Objectives may be amended, or new Objectives may be added, by mutual consent of the Parties

The HAG Recommends

- This annex is updated to be consistent with current US and Canadian regulatory standards set by health and wildlife agencies and a process by which newly identified pollutants can be included more readily.
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Annex 2 – Remedial Action Plans and Lakewide Management Plans

Under the Agreement’s Definitions (1c): “Impairment of beneficial use(s)” means a change in the chemical, physical or biological integrity of the Great Lakes system sufficient to cause any of the following:

Under (1ci): restrictions on fish and wildlife consumption.

Revise statement under (1ci)

- Restrictions on fish and wildlife consumption based on documented exposures and adverse health effects to humans or wildlife.

Under the Agreement’s Lakewide Management Plans for Critical Pollutants (6i): a definition of the threat to human health or aquatic life posed by Critical Pollutants, singly or in (synergistic or additive) combinations with another substance, including their contribution to the impairment of beneficial uses.

Include these statements under 6i as the ‘Status of the Problem’

- "Health"- is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO, 1948).⁶
- The Critical Pollutants from the waterways cause contamination of sediments which, in turn, ultimately pollutes aquatic life (e.g., Great Lakes fish).
- The contamination of Great Lakes fish impairs the beneficial use of fish consumption.
- Great Lakes research, on established cohorts, has demonstrated adverse health effects physically to vulnerable populations from exposure to Critical Pollutants at a given time by consumption of contaminated Great Lakes fish.

⁶ Reviewer Comment: Definition is out of context use the definition for Health with caveats discussed under Article 1.

- The populations that are particularly vulnerable are male and females from gestation to adulthood (i.e. menopausal), minority groups that consume large amounts of Great Lakes fish, older persons and other groups subsisting on Great Lakes fish.
 - While a number of investigators have demonstrated long-term threats to human health from exposure to persistent toxic substances in the Great Lakes basins, further studies, including trans-generational, are essential in order to determine the magnitude of the problem, the causative contaminants, the routes of exposure and the possible effects of multiple chemical exposures. These investigations may include carcinogenic, cardiovascular, reproductive, neurologic, immunologic, developmental and endocrine endpoints for those which (a) there is some evidence that they would be sensitive a toxicant exposure and (b) that this sensitivity is likely to translate into a significant increase in the burden of illness in the exposed population.
 - Great Lakes researchers have followed infants and children born to mothers consuming contaminated Great Lakes fish during and after pregnancy and have observed neurodevelopmental effects to these children over time associated with exposure to persistent toxic substances.
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Annex 3 – Control of Phosphorus

- All tables need to be updated. Data from 1976 now only has historical value.
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Annex 10 – Hazardous Polluting Substances

- This annex needs major revisions. The acute toxicological effects section (a) needs updating, but we need to add a major new section that deals with chronic toxicity (endocrine disruption, cancer, etc.) in fish, wildlife and humans.
 - Somewhere it needs to be stated that persistence of a contaminant is an important consideration, but not the only consideration since chronic exposure to less persistent chemicals can also result in biological effects. Under section (b), additional points should be added that include monitoring of levels of contaminants in water, fish, wildlife and humans.
 - Appendix 1 needs major updating. It does not include pharmaceuticals, flame retardants polybrominated diphenyl ethers (PBDEs) used as fire retardants in polyurethane foams, plastics, and textiles, perfluorooctane surfactants (PFOSs) used in upholstery, washable & dry cleanable fabrics, rugs, carpets & autos, leather shoes, boots, and coats protectors, phthalates found in a wide range of products such as food packaging, personal care products and children's toys.
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Annex 11: Surveillance and Monitoring

- Add a new section. Establish surveillance and monitoring systems to determine the health of fish, wildlife and human populations living in the Great Lakes Basin. For fish and wildlife this must include reproductive, endocrine and immune system function, as well as cancer. For the human population this must include study of neurocognitive function, infectious disease and immune function, fertility, endocrine and reproductive function, and rates of cancer, heart disease, diabetes, pulmonary disease and other chronic diseases. Particular attention should be paid to the health of children and the elderly. Surveillance and research should also be conducted for risk factors.
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Annex 12 - Persistent Toxic Substances

Under the Agreement's General Principles 2(a): Regulatory strategies for controlling or preventing the input of persistent toxic substances to the Great Lakes System shall be adopted in accordance with the following principles.

Add a new statement 2. (iv)

- To monitor and reduce air transport of persistent toxic substances emitted into the Great Lakes from both local and distant sources, as well as air transport of persistent toxic substances emitted from the Lakes to distant environments.

Under the Agreement's Monitoring (4): Monitoring and research programs . . . should be established at a level sufficient to identify:

Under 4a: Temporal and spatial trends in concentration of persistent toxic substances such as PCB, mirex, DDT, mercury and dieldrin, and other substances known to be present in biota and sediment of the Great Lakes System.

Revise this statement under 4(a):

- to include pharmaceuticals, phthalates, cosmetics, modern pesticides, PBDEs, PCDDs, PFOSs.

Under 4b: The impact of persistent toxic substances on the health of humans and the quality of living aquatic systems.

Include this statement under 4(b):

- The Parties shall maintain established cohorts from Great Lakes research programs to monitor over time the adverse health effects to residents from exposure to persistent toxic substances through fish consumption.

Under the Agreement's Early Warning System (5): An early warning system consisting of, but not restricted to, the following elements shall be established to anticipate future toxic substances problems:

Under 5e: Maintenance of a biological tissue bank and sediment to permit retroactive analysis to establish trends over time.

Include this statement under 5 e:

- The Parties shall maintain archived biological human samples (particularly, blood) collected and stored at designated central sites for established Great Lakes cohort, and shall continue to collect appropriate biological samples to 1) establish trends over time, 2) act as a sentinel if concentrations of persistent toxic substances rise over the observed time, and 3) identify new emerging chemicals of concern affecting human health (e.g., DBDE). The collection of human biological materials must be conducted according to ethical guidelines established by the Parties, including guidelines for consent, privacy, and communication to an individual and/or his/her physician in the event a sample is found to be positive for toxic substances.

Under 5j: Further development and use of reproduction, physiological and biochemical measures in wildlife, fish and humans as health effects indicators and the establishment of a database for storage, retrieval and interpretation of the data.

Include these statements under 5j:

- The Parties shall maintain and store, not only biological human samples at a designated central site, but will also store data on reproductive and other adverse health effects observed in various Great Lakes cohorts with exposure to toxic substances. The collection and storage of human biological materials, and of data generated from research on these materials, must be conducted according to ethical guidelines established by the Parties, including guidelines for consent, privacy, and communication to an individual and/or his/her physician in the event a sample is found to be positive for toxic substances.
- The Parties, using agreed upon methodologies and standards, will designate the date, location, population studied, exposure data, and particular health findings associated with exposure to Great Lakes toxic substances, and the contact person for this data, which will be stored in a central database accessible to Great Lakes researchers for interpretation of the data. The collection and storage of human biological materials, and of data generated from research on these materials, must be conducted according to ethical guidelines established by the Parties, including guidelines for consent, privacy, and communication to an individual and/or his/her physician in the event a sample is found to be positive for toxic substances.
- The use of various data sources (e.g., biological samples, observed health findings, environmental contaminant data) acts as a syndromic surveillance system which uses multiple data sources to detect potential disease clusters. In this case, the disease cluster would be health outcomes consistently associated with exposure to specific chemical contaminants. The collection and storage of human biological materials, and of data generated from research on these materials, must be conducted according to ethical guidelines established by the Parties, including guidelines for consent, privacy, and communication to an

individual and/or his/her physician in the event a sample is found to be positive for toxic substances.

- If a consistent pattern of health effects is observed and interpreted as resulting from exposure to a particular (Great Lakes) toxic substance, the Parties may consider use of the adverse health effect as a biological marker of effect (human health effects indicator) for the specific toxic substance.

Under the Agreement's Research (7): Research should be intensified to determine the pathways, fate and effects of toxic substances aimed at the protection of human health, fishery resources and wildlife of the Great Lakes Basin Ecosystem. In particular, research should be conducted to determine:

Under 7a: The impact of persistent toxic substances on the health of humans and the quality of living aquatic systems.

Include this statement under 7a:

- Great Lakes research has established that the primary mode of exposure to residents from Great Lakes contaminants is by fish consumption.
- The Parties need to consider the contribution of other modes of exposure, such as inhalation or ingestion of persistent toxic substances found in shower water or cooking with contaminated water.

Include this statement under 7b:

- The Parties need to continue research identifying adverse health effects associated with consumption of contaminated Great Lakes fish in established Great Lakes cohorts and to investigate the interactive effect of multiple chemicals in fish and other modes of exposure in order to determine if these exposures act additively to produce health effects when the chemicals exceed or are even below current health-based guidance levels.

Annex 15 - Airborne Toxic Substances

Under the Agreement's Research (2): Research activities shall be conducted to determine pathways, fate and effects of such toxic substances for the protection of the Great Lakes system. In particular, research shall be conducted to:

Under 2b: understand the effects of persistent toxic substances, singly or in synergistic or additive combination with other substances, through aquatic exposure routes on the health of humans and the quality and health of aquatic life where a significant source of these substances is the atmosphere. . .

Include this statement under 2b:

- The Parties need to continue research identifying populations with the possibility of increased exposure due to airborne particles (i.e., living downwind of a coal-

fired power plant emitting mercury) contaminating the soil and water setting up a food-chain cycle of contaminated fish consumed by Great Lakes residents.

- Enhanced and improved computer models need to be developed to demonstrate the fate of airborne contaminants, the ultimate expected level of contamination in the human food supply such as fish, and the potential for development of adverse health effects expected at the contaminant level from ingested fish.
- Reduce the incidence of exposures and effects of asthma and other respiratory and cardiovascular diseases from air borne pollutants.

2c: develop models of the intermediate and long-range movement and transformation of toxic substances to determine:

Revise statement 2c:

- develop models of the intermediate and long-range movement and transformation of toxic substances and health effect studies to determine:

Add a new statement 2c (iii)

- the effect of airborne release of contaminants from the Great Lakes and how these impact human health by inhalation and ingestion

Annex 17- Research and Development

Under the Agreement's Implementation (2): The Parties in cooperation with State and Provincial Governments shall conduct research in order to:

Under 2I: develop approaches to population-based studies to determine the long-term, low level effects of toxic substances on human health.

Include this statement under 2I:

- The Parties will maintain established cohorts from Great Lakes population-based research studies and will examine particularly polluted areas in the Areas of Concern (AOCs) that have high rates of acute or long term adverse health outcomes that may be associated with the contaminants detected at the site.
- The Parties will develop models to evaluate community-based research regarding long-term surveillance of disease outcomes.
- The Parties will follow these populations over time and will collect contaminant levels in different media, particularly in fish, and investigate the potential of these exposures for adverse health outcomes.
- For areas with high rates of specific health outcomes that have been shown by Great Lakes researchers to be related to single or multi-route exposure to specific chemicals found in the AOC, the Parties will undertake a more in-depth investigation to determine if an exposure - response relationship exists for specific health outcomes.

- The Parties will report the findings in a timely manner and provide milestones for reduction of any adverse outcomes caused by sources within or source affecting the Great Lakes
- The Parties, using agreed upon methodologies and standards, will designate the date, location, population studied, exposure data, and particular health findings associated with exposure to Great Lakes toxic substances, and the contact person for this data, which will be stored in a central database accessible to Great Lakes researchers for interpretation of the data.

Add a new statement:

- Determine the impact of climate change and global warming on the integrity of the ecosystem of the Great Lakes, and devise programs and methods for minimizing adverse effects.

Final Recommendation

The Agreement makes health-related recommendations under various Annexes. HAG supports developing a new annex devoted to human health (Annex 18 - Human Health).

Under each heading of this annex, the “Status” of the recommendation can be made followed by “Recommendation/s” to the Parties.

Placing all human health recommendations in one place with specific guidelines will facilitate compliance of these recommendations.

Terms of Reference for the Health Advisory Group on Agreement Review

Role

The Health Advisory Group (HAG) on Agreement Review shall advise the Commission with respect to matters of human health science and policy in relation to the review of the Agreement. The HAG will assess the extent to which the Agreement identifies, reflects, and addresses human health considerations and also will determine what changes, if any, may be required for improving the utility and effectiveness of the Agreement to protect human health.

Membership

The Health Advisory Group (HAG) on Agreement Review shall be selected from the members of the Agreement Boards, International Air Quality Advisory Board, Council of Great Lakes Research Managers, and the Health Professionals Task Force with expertise in matters of human health, science, and policy.

Responsibilities

1. To identify key aspects of the current Agreement which need to be retained to protect human health.
2. To identify new areas of binational concern with respect to human health.
3. To assess new knowledge that is relevant to policy and programs under a revised Agreement, and determine how that knowledge can be applied to explicitly address human health protection, and the goals of restoring, maintaining and sustaining a healthy environment and healthy people as an Agreement purpose.
4. To consider institutional aspects in relation to human health that could strengthen the development and implementation of RAPs and LAMPs to address existing and emerging threats to human health.
5. To consider other institutional aspects in relation to health and environment that involve local public health issues as may be relevant to basin-wide environmental impacts that are of binational concern.

Reporting

The Group will provide recommendations to the IJC by Spring 2006, in relation to health aspects relative to the Commission's ongoing priority to assist the Parties in their review of the operation and effectiveness of the Agreement.

Adopted: June 8, 2005

List of Background Documents Provided to the Health Advisory Group

1. Great Lakes Science Advisory Board Health Recommendations 1989 to 2003
Priorities Reports (compiled by staff)
 - a. Summary of Recommendations(compiled by staff)
2. Science and the Great Lakes Water Quality Agreement - IJC Science Advisory Board's Discussion Summary and Recommendations to the IJC Based on the 132nd Meeting of the Board, held February 4 – 6, 2004, Michigan League, Ann Arbor, Michigan
3. Communication from the Commission to the Council, the European Parliament and the European Economic and Social Committee - A European Environment and Health Strategy, Brussels, 11.6.2003,COM (2003) 338 final
 - a. Summary of Strategy (compiled by staff)
4. Health Recommendations from the 5th to 12th Biennial Report (compiled by staff)
5. IJC Mandate for Human Health Issues (compiled by staff)
6. Back to the Future: Rediscovering the Requirement for Monitoring in the Great Lakes Water Quality Agreement (Glen A. Fox)
7. Holistic Risk-Based Environmental Decision Making: A Native Perspective (Environmental Health Perspectives, Volume 110, Supplement 2, April 2002)
8. Human health research and policy development: experience in the Great Lakes region (Int. J. Hyg. and Environ.- Health, 208, (2005), 7-13

List of Questions to Solicit comments from the HAG membership

1. Why does health need to be explicit?
2. Is the Agreement protective for the Great Lakes population and based on good science?
3. Is the health approach proactive and preventive?
4. Does the agreement need to be integrative with public health education efforts and involvement?
3. What aspects of a "population approach" need to be prescribed?
4. Should general and specific objectives for health and ecosystem health be defined in the Agreement?
5. Does surveillance and monitoring of human populations need to be included?
6. How will human health be integrated with ecosystem health?
7. How will public involvement in health policy be accomplished? What other examples of public health involvement can be drawn from?
8. How will human health be defined for the purposes of the Agreement, providing a rationale for human health considerations within the Agreement?

It was suggested that members of the group consider the above questions as well as review the articles and annexes as they specifically pertain to human health as the latter exercise might be very worthwhile in terms of understanding what approaches could be recommended by the Group in providing a comprehensive analysis.