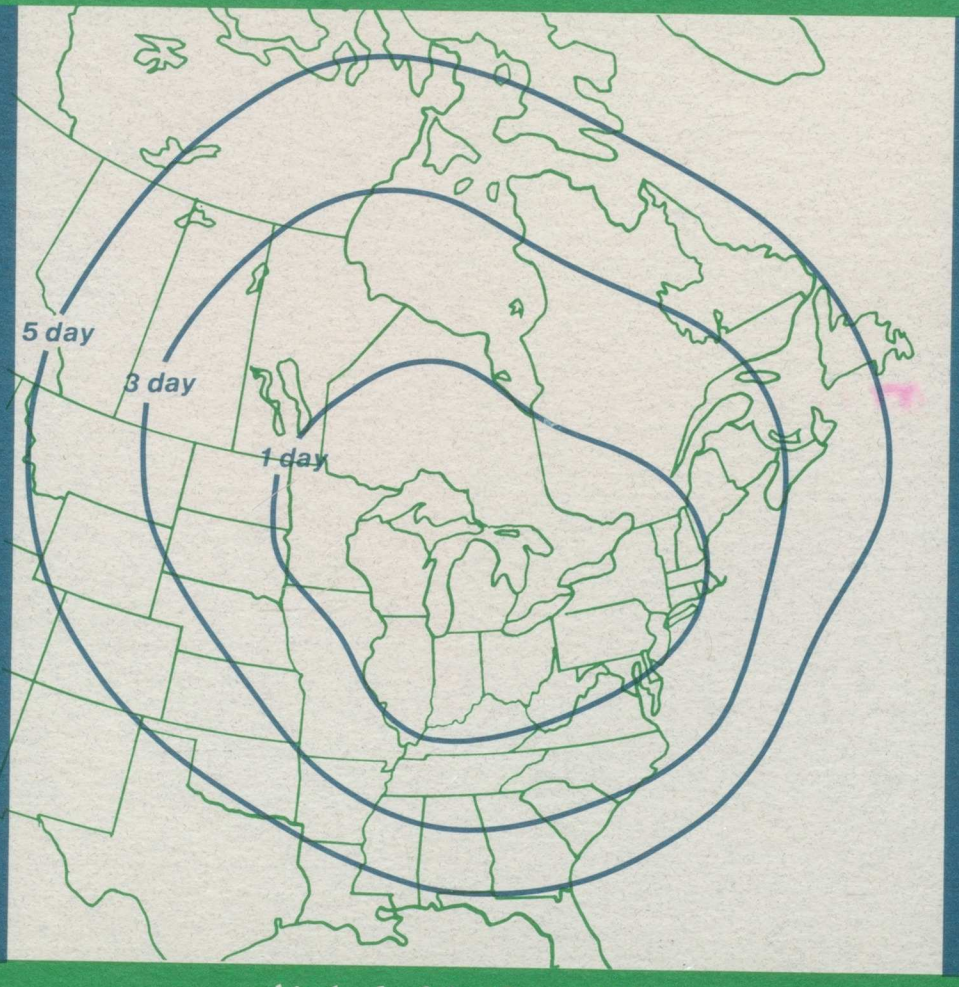
1992-10-01

International Air Quality Advisory Board. Progress Report Fourteen to the International Joint Commission for Consideration at the Semi-Annual Meeting, Ottawa, Ontario, Canada, October 1992

International Air Quality Advisory Board

International Air Quality Advisory Board

Progress Report Fourteen to the International Joint Commission



Airshed of the Great Lakes

October 1992

International Joint Commission
Commission mixte internationale

PROGRESS REPORT 14

TO THE

INTERNATIONAL JOINT COMMISSION

BY THE

INTERNATIONAL AIR QUALITY ADVISORY BOARD

FOR CONSIDERATION AT THE

SEMI-ANNUAL MEETING

OTTAWA, ONTARIO, CANADA

OCTOBER 1992

Cover Figure:

Lines of the median locations of air parcel starting points one to five days prior to arrival in the Great Lakes region. The 3-day line indicates that half the time the air in the Great Lakes region would have originated 3 days earlier within that line and half the time beyond it.

TABLE OF CONTENTS

1. MEASURING SUSTAINABILITY: THE ULTIMATE ENVIRONMENTAL INDEX

1a. Introduction

The 3-legged stool of "sustainability" (Figure 1) is an apt symbol for representing the struggle of North Americans to balance their ecosystem, their economy and their social needs. The stool (society's invention) is made from a product of the ecosystem (wood), but that product is currently one of the important parts of North America's economy.

The stool sits in the environment (our earth) because without the environment we have nothing -no wood, no people and no future. Even though the environment is the basis of life - humankind has created society as well as defining how society functions - the economy. The 3-legs of the stool represent then the 3 parts of the "sustainability" balance - the North American ecosystem (that part of the environment physically located within the political boundaries of North America), the North American Economy and the society of North America. The seat of the stool represents the "governance process" and the 3 legs are embedded deep in this governance process, because it is the "governance" which produces the stability of the system over time. A lack of confidence in the governance process by any one leg of the "sustainability stool" will lead to instability of the whole stool because society, the economy and the ecosystem are intricately linked together.

Chief Seattle (1854) said "humankind has not woven the web of life. We are but one thread within it. Whatever we do to the web we do to ourselves. All things are bound together. All things connect. Whatever befalls the Earth befalls the children of the earth."

The challenge, not only for North Americans but also for the world, is to measure the stability of the "stool" in away which we all understand. This measure of "sustainability" must respond to individual and collective actions which improve or degrade the environment.

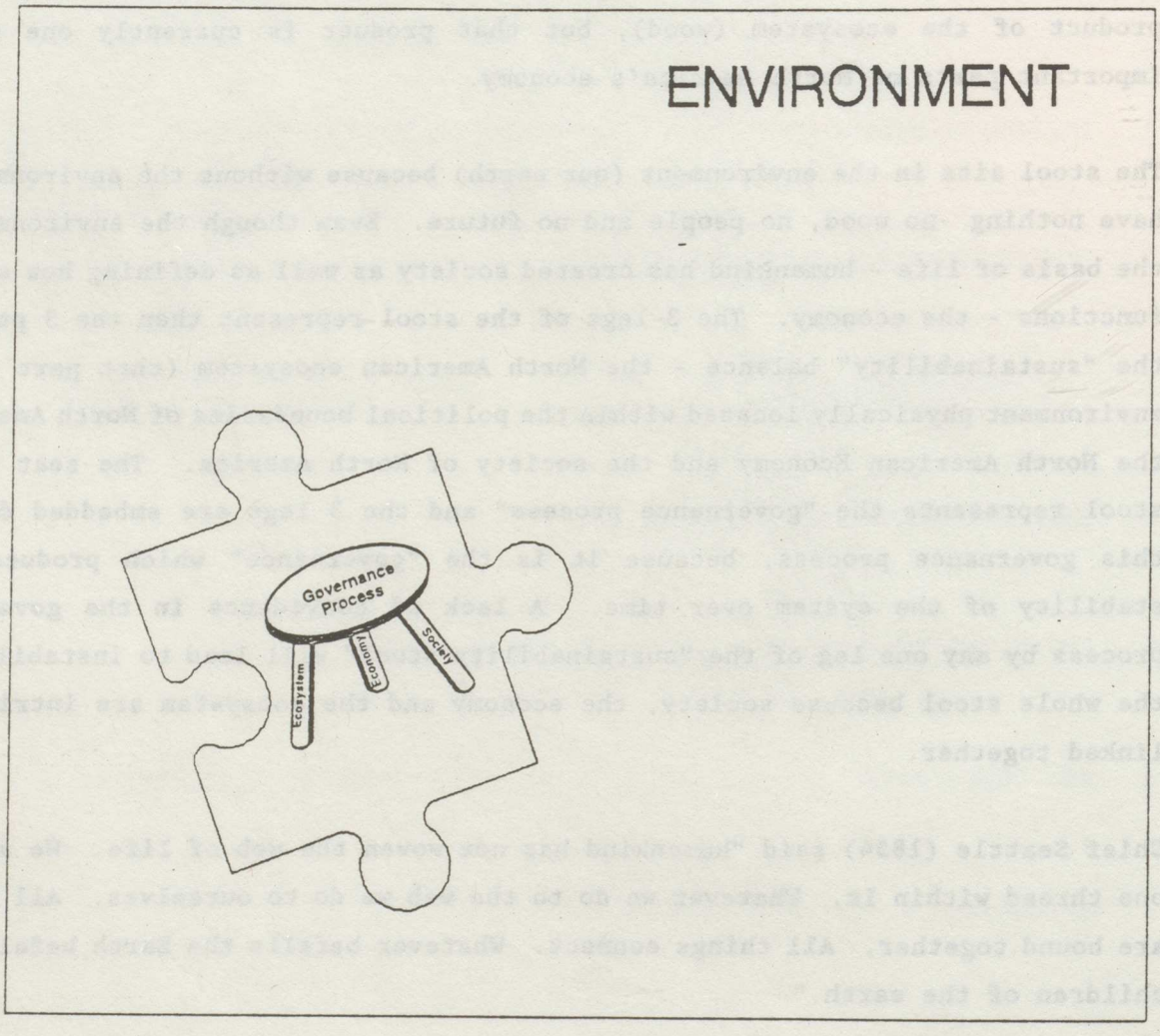


FIGURE 1: SUSTAINABILITY STOOL

The task outlined here is to design a "sustainability index" and apply it to North America.

1b. Context

We will start from the premise that ecosystem, economy and society are equal parts of "sustainability".

Ecosystem indices are representative measures of the state of the environment (e.g. the PSI Pollution Standards Index) while economic indices are representative measures of the state of the economy (e.g. the cost of living index; the GNP).

The trick, for a successful sustainability index, will be to ensure that the important aspects of the ecosystem, the economy and society are included--that everyone can find a measure that applies.

The structure proposed is a simple scale of 0 → 100 where 100 represents society's ideal of sustainability. The index will be made of 3 types of indicators - ecosystem indicators, economic indicators and social indicators.

Each indicator will initially have the same weight. This can be adjusted later as we try to match the index to our collective perception. Each indicator will be constructed using the same scale (0 → 100) where 100 represents the ideal state of the indicator.

The overall index must be relatively stable (no wild variations) but must be responsive to changes in the underlying indicators. The basic structure proposed is outlined in Figure 2. The figure shows that 3 major areas (ecosystem, economy and society) need not have the same number of indicators and that any particular indicator can be looked at in detail. This type of system meets the need of being stable (indicators can be added, removed or changed in any area with a minor effect on the overall index) while being responsive to individual action. The sub-indices will be more changeable than the sustainability index and an individual indicator will be very variable.

Figure 2

STRUCTURE OF SUSTAINABILITY INDEX

SUSTAINABILITY INDEX (SUST)

ECOSYSTEM SUB-INDEX (ENV)	ECONOMY SUB-INDEX (ECO)	SOCIAL SUB-INDEX (SOC)
Indicator EN1[1]	Indicator EC1[1]	Indicator S1[1]
Indicator EN2	Indicator EC2	Indicator S2
Indicator EN3	Indicator EC3	Indicator S3
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
Indicator EN41	Indicator EC33	Indicator S27

* $SUST = \frac{1}{3}(ENV + ECO + SOC)$

[1]All indicators have a scale 0 - 100

$$ENV = \frac{1}{41}(EN1 + EN2 + EN3 + ... + EN41)$$

$$ECO = \frac{1}{33}(EC1 + EC2 + EC3 + ... + EC33)$$

$$SOC = \frac{1}{27}(S1 + S2 + S3 + ... + S27)$$

1c. Examples

The following linear examples are meant only to outline the form of indicators. Linear indices may be too simplistic, considering the complexities of the system. The process of selecting indicators must involve the public as well as experts so that (1) no obvious measure is overlooked, (2) the correct mathematical form is adopted, (3) undue weight is not given to any part of sustainability, and (4) local and individual concerns are incorporated. Where there is doubt about use of an indicator, the indicator should be included, tested over time and then reviewed for applicability. In fact, the index (and all its sub-parts) must be regularly reviewed, tested and changed as necessary to reflect our evolving state of knowledge and concerns.

The following are some illustrative examples for sub-indices that could be used in the construction of the sustainability index.

Example 1 - Number of Beach Closures due to Contamination (Ecosystem or Social)

Indicator	No. of Closures/ Year in North America	Remarks
100	0	Long Term Goal
0	5	Arbitrary condition based on current statistics
$\frac{100}{5}(5-X)$	X	Indicator equation

Example 2 - Number of Cylinders per Person (Social)

Indicator	No. of Cylinders per Person	Remarks
100	1	Long term goal for North America (based on 2 people/1 car/2 cylinder)
0	12	Worst case (based on 2 people/3 cars/8 cylinders)
$\frac{100}{11}(12 - X)$	X	Indicator equation

Example 3 - No. of Species Disappearing (Ecosystem)

Indicator	No. Species that Disappeared Over Last 5 Years	Remarks
100	0	Long term target for globe (measure of biodiversity)
0	A	Based on worst 5 year average
$\frac{100}{A}$ (A - X)	X	Indicator equation

Example 4 - Forest Replacement (Ecosystem)

Let Fc = % of North American forest cut
Let Fr = % of North American forest replanted

Indicator	Fr/Fe	Remarks
100	1	Replace all of cut
0	½	Replace ½ of cut
200 (X - ½)	X	Indicator equation

Example 5 - Acid Rain (Ecosystem)

Indicator	Sulphate Loading in Kg/Ha	Remarks
100	10	Pristine State
50	20	Protect moderately sensitive lakes
5 (20-X)	X	Indicator equation

Example 6 - Health (Social)

Indicator	Doctor Visits/Person/Year	Remarks
100	1	Ultimate goal (1 checkup per year)
0	10	Level indicative of ill health
$\frac{100}{9}(10-X)$	X	Indicator equation

Example 7 - Income (Economic)

Indicator	Increase in Average Real Income per Person	Remarks
100	$\geq$1.5%	Usual economic measure of healthy growth
0	0%	Economic breakeven
$\frac{100X}{1.5}$	X	Indicator equation

Some further suggestions for sustainable indicators are provided in Table 1.

1d. Presentation

Figure 3 outlines one presentation approach that could be used for "sustainability" reporting. It is drawn to reflect an environmental status perspective with some attempt to look at sustainability through the trends analysis. This is presented as illustrative only.

TABLE 1: SOME SUGGESTED SUSTAINABILITY INDICATORS AT PROVINCE/STATE LEVEL

No.	Description	Value of Indicator	
		0	100
1	State of Knowledge - % of forest inventoried	0%	100%
2	Diversity - % of world's mountain goats	30%	60%
	- % of world's trumpeter swans	25%	50%
	- % of world's grizzly bears	12%	25%
	- % of world's bald eagles	12%	25%
3	No. of species on "mngt concern" list	75	0
4	Land Conversion - % of total land converted to urban	20%	0%
	- % of prime farmland converted to urban	2%	0%
	- % of land which is prime farmland	0%	4%
5	Tonnes of solid waste produced per year	3 million	0.1 million
6	Amount of solid waste recovered by recycling	0%	100%
7	Amount of packaging by year 2000	0% redox	100% redox
8	Water pricing	$0	real cost
9	Number of boil water edicts per year	10	0
10	Systematic water use planning in what % of North America	0%	100%
11	Number of wells going dry	5	0
12	% of marine waters free of pollutants	50%	100%
13	No. of shellfish harvesting closures	5	0
14	% of wetlands converted to agriculture	100%	0%
15	Decrease in annual abundance of 5 species of salmon	100%	0%
16	Automobile population increase vs population rate	2	0.5
17	Trend in SO2 levels over next 20 years	double	half
18	Change in total emissions of greenhouse gases/year	-10%	+20%
19	Change in emissions of ozone layer depleting gases/year	-10%	+20%
20	% Increase in energy demand over the next 20 years	5%	0%
21	Use of Hydroelectricity - clean since no pollutants		discussion
	- dams,transmission lines degrade ecosystem		required
	- construction provides jobs		
22	% of exports based on non-renewable natural resources	5%	0%
23	Growth of the economy (currently 4.7%)	0%	5%
24	GLs Region per capita income minus North American average	-5%	+15%
25	% of population earning less than $20,000	75%	10%

No.	Description	Value of Indicator	
		0	100
26	Structure of employment pool - Ep/Ej where Ej = % of jobs needing >12 years education and Ep = % of population with >12 years education	0.5	1.0
27	% of government expenditures on social programs	0%	30%
28	% of government expenditures on health	30%	15%
29	% of government expenditures on welfare	20%	5%
30	% of government expenditures on education	10%	25%
31	% of government expenditures on environmental mngt	1%	5%
32	% of government expenditures on economic development	0%	2%
33	Portion of debt servicing costs	15%	0%
34	Population increase in %/year	5%	0%
35	% of total number of gov't programs eliminated in past year	0%	10%
36	% change from target GDP/person (+ or -)	20%	0%
37	% change from inflation rate target (+ or -)	10%	0%
38	% change from unemployment rate target (+ or -)	20%	0%
39	Competitiveness		
40	Viability Index for replanting trees*		
	* how many seedlings make it past 2 metres height?		

Potential Status and Trends Assessment

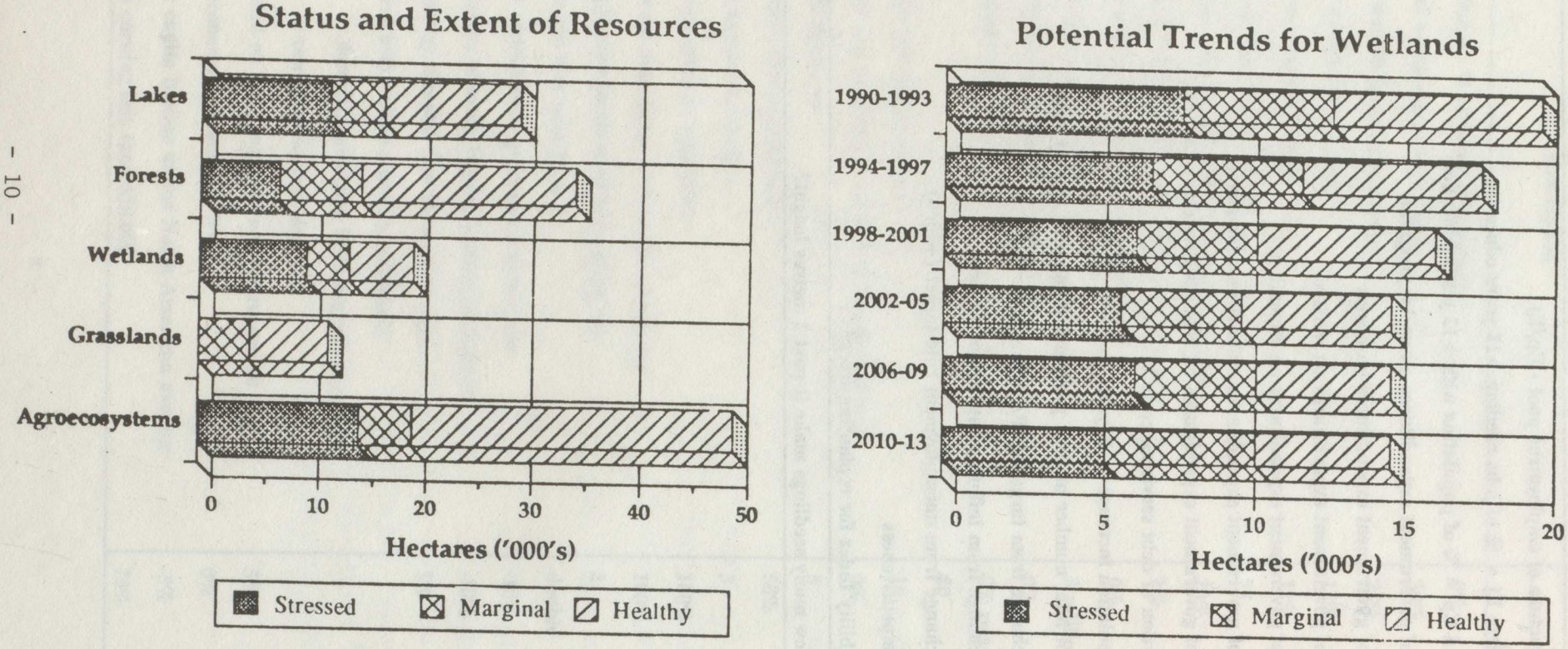


FIGURE 3: PRESENTATION MODEL

1e. Where Next

The IAQAB seeks advice from the Commissioners on the next steps, if any, that should be taken to develop the index. If viewed favourably, the Board feels that considerable advice should be sought through perhaps a meeting of experts in all three areas: environment, economics, and society. Such a group might be convened to attempt a first cut to develop an outline for the full "Sustainability Index".

This work on an annual index of sustainability has not yet been subjected to a full critique by the Board. Several of the Board members have strong reservations. These are that, first, the proposal should really apply to the whole of both countries rather than be a product of the IJC which limits its purview to the transboundary region. Second, the actual preparation of the index may require many more resources and time than the Air Board can devote to it. Third, it can balloon into a major effort and controversy by differences in detail between and among each of the groups contributing to the single index. In economics alone, countries employ many indices to denote achievements and trends. In fact, the IAQAB does not have the capability to evaluate the economic and social component of the index. Finally, while some may compliment the IJC for pioneering such an index, others may criticize the undertaking for many reasons such as when their particular geographical region or special interest stands at odds with this single number. The IJC and the Board need to explore these issues in some detail.

2. CONSEQUENCES OF GLOBAL WARMING IN THE GREAT LAKES REGION

Prior to the eruption of the volcano at Mount Pinatubo, in the Philippines, the Sea Grant College Program at Ohio State analyzed the consequences of the predicted Greenhouse climatic change in the Great Lakes area based on projections from three modelling studies at NASA (GISS), NOAA (GFDL) and Oregon State University. The common climatic changes when the world contains twice as much carbon dioxide as in the pre-industrial era have been noted along with the differences expected among them. Ten questions were examined dealing with the economic and social aspects of the people, ecology, and commerce of the Great

Lakes region. The discussion of each question includes the present and future state of affairs in two or three pages of text and figures. The answers to all the questions depend on the nature of the climate resulting from increasing Greenhouse gases. All scientists agree that there remain uncertainties in the predictions of future climate and especially of the climate of a limited region of the globe such as the Great Lakes. The Ohio State study devotes five pages to this uncertainty before introducing its answers to the societal questions.

The full analysis can be obtained from Ohio State University. Only a brief summary is included below. Quotes are verbatim text from the report.

1. **How will water resources in the Great Lakes Region be affected?**

First the demand for water "is increasing at a tremendous rate". By 2020 AD: power generation will need 15 times more land and 13 times more water than at present; industry will need 8 times more water, agriculture will use 5 times more water, and twice as much sewage capacity will be needed for a doubled population. The sense of change of the future Great Lakes hydrology appears in Table 2. Finally, it is suggested that the adverse impact of warming on the water of the Great Lakes might be moderated by intelligent use of water resources based on firm information.

2. **Will Biological diversity in the Great Lakes Region suffer?**

It is argued that we should try to maintain biological diversity everywhere but that many factors, including pollution, are even today threatening some species. It is pointed out that global warming can also warm both the waters of the Lakes and their surrounding environment and alter the nature of the land ecosystem especially forests. All will impact the diversity, probably negatively.

The main recommendation is simply to accept a lifestyle that prevents the growth of Greenhouse gases - a recommendation that would apply to any adverse effects in response to any of the ten questions.

3. **What could happen to Great Lakes shipping?**

The magnitude and importance of current shipping to the area's economy from iron to grain is emphasized. The concern about Greenhouse warming related to the possibility that the water will become shallower. For example, in the relatively shallow Lake Erie, a one meter drop might decrease cargo capacity by 14%, increase costs by 14%, and necessitate an additional 50 days for cargo delivery. Any reduction in lake levels will increase the frequency of dredging the connecting channels. Boats can be redesigned but commercial interests are unlikely to spend large sums of money given the uncertainties of the climate forecasts.

4. **How will Agriculture in the Great Lakes Region be affected?**

Some 42% of the land surrounding the Great Lakes is used for agriculture and 10% for pasture. The eight states alone produce nearly a quarter of the total agricultural output in the United States. There are three possible benefits for agriculture of the Greenhouse warming and the Greenhouse gases. First, the zones in which certain crops can be raised may move northward into the region. Second, a longer growing season would allow for earlier planting and later harvesting. Third, carbon dioxide is a needed nutrient for crops and forests such that more carbon dioxide can increase productivity. But there are also potential drawbacks. Crops or forest productivity may be ultimately limited by soil nutrients not atmospheric carbon dioxide. Pests and weeds may be much more of a nuisance in warmer climates. Warmer weather increases evaporation so that soil moisture may become the limiting factor to productivity. Finally, if the water from the lakes used for irrigation becomes less available or more costly; this can impact agriculture. It may be possible, if accurate predictions of impacts on Great Lakes agriculture can be estimated, to take steps to avoid many of the potential difficulties.

Table 2

Projected Impacts of Global Warming on Great Lakes Hydrology

Snowmelt	Decrease
Runoff	Decrease
Soil Moisture	Decrease
Lake Evaporation	Increase
Overlake Precipitation	Increase
Lake Surface Temperature	Increase
Ice Cover	Decrease
Net Basin Supply	Decrease
Lake Levels	Decrease

Source: Cohen (1989)

5. Will it affect airborne circulation of toxics?

While agreeing that airborne transport and deposition of toxics is currently important to the waters and environment of the Great Lakes, the uncertainties in changes of storminess and prevailing winds prevent any meaningful answer to this question.

6. What are the implications of low water levels in Great Lakes estuaries?

The ecological importance and current threats to the wetlands around the Great Lakes are recognized. The impact of Greenhouse warming mainly depends on the expected change in lake level. One estimate by NOAA in the U.S. predicts a 1 to 2.5 meter reduction because of greater evaporation and urban water usage. When lake levels drop, wetlands are lost. Some species in the wetlands can migrate or adapt to new conditions but many species, including economically important fish, cannot. If the Great Lakes are headed in the direction of persistent lower levels, management to protect ecosystems will be vital.

7. Will it speed eutrophication in the Great Lakes?

The eutrophication brought on by vertical thermal stratification of water bodies, especially Lake Erie, will be exacerbated when Greenhouse warming of the lower atmosphere becomes marked. By taking steps to minimize pollution, it is possible that the effects of the increased stratification would be less likely to produce eutrophication than might otherwise occur.

8. What could happen to Great Lakes recreation?

The current attractiveness of the Great Lakes for various recreational activities could be adversely affected if water temperature rises, water level decreases and less snow falls (affecting skiing). These impacts, if they occur, would be worsened by the expected growth in population which would then further stress the lakes and their receding shorelines.

9. **How could fish populations in the Great Lakes be affected?**

"Since the last glacier retreated about 10,000 years ago hundreds of fish species have colonized the Great Lakes. Although some invaders have migrated elsewhere or become extinct, others have become the current lake residents. Ironically, two variables - human activity and climate change - that have had a great influence over fish populations in the past are becoming increasingly inter-related today."

Most fish survive in three temperature niches of water. Fish migrate long distances to find optimal conditions. "Warmer temperatures over the year would speed up fish metabolism. Whether or not this would accelerate growth rates...would depend upon prey availability". However, phytoplankton, the fish's food, may increase; two model calculations suggest an increase in phytoplankton production of 1.6 to 2.7 resulting in fish that might be 20 to 47% bigger. But there are also a number of downsides to this possibility of increased phytoplankton production rate. For example, parts of some of the lakes in some seasons might become anoxic (lose their oxygen).

If the hydrologic cycle is disturbed by the Greenhouse warming, higher temperatures and lesser runoff might produce spawning habitats in tributaries that are much less suitable for fish than at present.

Thus, while factors connected with Greenhouse warming might "generally benefit commercial and recreational fishing in the Great Lakes" it is possible that warming of regional wetlands, eutrophication, toxic pollution, and exotic species might "outweigh the positive ones".

10. **How will forests in the Great Lakes Region be affected?**

In general, "while global warming may increase the amount of suitable habitat for some species, it will probably have devastating consequences for many American trees." The expected warming could result in a northward displacement of ecological zones. The northward movement of sugar maple is illustrated in Figure 4. "The primary concern is that these shifts may occur

so quickly that ecosystems will not be able to keep up". It is pointed out that many tress are already under stress because of acid rain, heavy metals and organic pollutants. The warming and possible changes in precipitation may add to this stress.

The forests are a major economic and recreation resource in the Great Lakes area. It is suggested that if Greenhouse warming is taken seriously, preparations to cope with the new forests of the future be experimented with soon.

It should be emphasized that the study was conducted prior to the eruption of Mount Pinatubo in the Philippines and that the analysis did not consider the impact of this type of natural event.

3. ATMOSPHERIC DEPOSITION TO THE GULF OF MAINE TRANSBOUNDARY REGION

On the occasion of the IJC semi-annual meeting in Washington, (April 1992), the Co-Chairs of the St. Croix Board met with the International Air Quality Advisory Board to discuss the impacts of atmospheric deposition in the St. Croix watershed. In particular, they noted some anomalies with respect to mercury levels in wildlife. It was agreed that the IAQAB would, if possible, meet with the Gulf of Maine Council to discuss the relevance of air quality deposition to the Gulf.

The Gulf of Maine Council was established approximately two years ago by the Premiers of New Brunswick and Nova Scotia and the Governors of Maine, Massachusetts, and New Hampshire to foster the sustainable development of the Gulf. The Chair of the Council from July 1991 to July 1992, was the Honourable Jane Barry, Minister of the Environment for New Brunswick. The present Chair is Ms. Susan Tierney, Commissioner of Environment for Massachusetts. Mrs. Barry invited Commissioner Cleveland and Dr. Young to attend the semi-annual Council meeting in New Brunswick, and asked Dr. Young to discuss atmospheric deposition issues with the members. The discussion, prompted by Dr. Young's remarks, was a lively one, revolving around the concept of the Gulf of Maine airshed, pollutant

Projected Sugar Maple Migration

Present

General Circulation Models

Goddard Institute for Space Studies (GISS) 2 x CO_2

Geophysical Fluid Dynamics Laboratory (GFDL) 2 x CO_2

Source: Zabinski and Davis (1989)

Ohio Sea Grant GCS#10(1)

FIGURE 4

origins and deposition patterns, and the need for a mass balance for the pollutants of concern to the Council. The fact that NOAA was also planning a sophisticated study of oxidant patterns over the Gulf Region during 1993 was also highlighted, and several Council members encouraged the involvement of Canadian scientists in the effort.

Ms. Tierney asked that the IJC continue to work in a positive way with the Council particularly with reference to air issues. The IAQAB recommends that:

The International Joint Commission, through its Air Quality Advisory Board, work with the Gulf of Maine Council to co-sponsor a workshop on pollutant mass balance within the Gulf region.

4. MERCURY IN THE ENVIRONMENT

The presence of mercury in the environment is associated with the release of inorganic mercury via one or more pathways such as emissions to atmosphere, releases from sewers, direct release from industry to the water or land, releases from landfills, etc. It is then accumulated in one or more media, transformed to the organic compound: methylmercury, bioaccumulated in both inorganic and organic forms, and finally can potentially affect human health. In the Great Lake region of North America there is significant concern about mercury because of the presence of point and area emission sources that can lead to the accumulation of mercury and exposures of segments of the population in Canada and the United States.

For mercury, the conditions in the Great Lakes have to be defined within the context of the global environment; therefore, the levels of mercury must be first examined by defining the background level. The background is a result of degassing of the earth's crust. The emissions from natural sources will eventually find their way into the lake ecosystem and establish the baseline deposition patterns of both inorganic and organic forms of mercury in water and soil.

The major sources of anthropogenic emissions of mercury are the combustion of fossil fuel, incineration and smelting. Mercury can also reach the environment by a number of other pathways. For example, the sewer system is used for disposal by the electrical industry, in the production of chlorine, and in dentistry. Mercury is used in consumer products, to mildew proof paints and in dental fillings. Landfill sites may also release mercury.

Unlike the acid rain problem, the greatest risk of exposure and possible health effects occur near high emission areas. This results from the fact that mercury is a primary pollutant, which accumulates and deposits in greatest concentrations near the source. Once emitted, the soluble forms of mercury have residence times in the atmosphere which depend upon the rate of wet and dry deposition. In the terrestrial environment, the lifetime is in the order of weeks. In contrast, metallic mercury vapour can persist in the atmosphere for over a year.

A major concern for bioaccumulation arise when methylmercury is formed in an aquatic environment by biological action. The methylated mercury can enter the food chain and eventually lead to human exposures through consumption of fish that inhabit the affected region. Other exposures to mercury occur as a result of inhalation and ingestion of inorganic mercury.

The most convincing exposure-response data are from the effect mercury has on humans in populations that consume fish laden with methylmercury. A low risk of neurological damage can exist in adults. However, the greatest risk appears to be associated with the development of the fetus (prenatal effects). The inorganic forms of mercury can give rise to acute toxicological effects in humans and are primarily associated with inhalation or consumption in the occupational environment.

Since the main concern for human effects appear to be from the bioaccumulation route in edible fish species, it is important to assess this pathway. This must also be done for other chemicals in the Great Lake regions. The approach should include estimates of the global background, identification of areas located close to the ability to priorize multimedia sources, partitioning the contribution from each medium, estimation and priorization of the routes of exposure, and the

identification of areas which have the greatest potential for human exposure.

In contrast to lead, polycyclic aromatic hydrocarbons, PCB and DDT, there is little data available on the deposition of mercury to the Great Lakes region. This area should be considered as a priority by the IJC because of the potential for human exposure in Canada and the U.S.A.

5. EMISSION INVENTORY OF TOXIC AIR CONTAMINANTS

In our previous report, the IAQAB recommended that:

> **"the IJC evaluate the merit and feasibility of being the host for the Inventory of Toxic Air Contaminants for the Great Lakes States upon completion of the project along with other roles the Commission could play to facilitate the access and use of the data by the researchers and resource managers of the region."**

After some discussion, the Commission requested that the IAQAB carry out this task and report further to it.

We have completed this task. The Great Lakes Commission is undertaking a comprehensive effort to compile data on regional sources of certain airborne toxic pollutants. These data, once compiled should be useful to the IJC in its efforts to assess and understand the impact of sources of airborne toxic pollutants on the Great Lakes system. However, for the reasons outlined below the IAQAB now recommends that:

> **the IJC not be the host for this database.**

Our reasons for this recommendation are:

1. the inventory needs to be kept up-to-date and maintained regularly. This type of task fits neither the structure nor the resources of the IJC;

2. Most inventory systems do not include the ability to do high quality trend analysis because there is no back-calculation mechanism to correct errors from previous years in a consistent way. The IJC does not have the staff to undertake this task but should recommend that this ability be added to currently available databases;

3. The size of the database and the task of providing support to users requires a dedicated staff and a large dedicated computer. The IJC does not have the staff nor the hardware to accomplish this task.

As the data may prove very useful to carrying out ongoing interests and responsibilities of the IJC, the IAQAB recommends that:

the IJC encourage (1) the establishment of an inventory center; (2) its use by resource managers of the region; and (3) the collection of comparable data within Canada.

6. NEW COGENERATION PLANTS IN THE WEST: TRAIL SMELTER REVERSED?

It has come to the Board's attention that a number of cogeneration plants have been permitted on the Washington side, and are under consideration on the British Columbia side, of the Washington-British Columbia border. Since there is an existing ozone problem in the Lower Fraser Valley of British Columbia, the introduction of these new sources of pollution represents a potential concern to the environment. The Board has already looked into some aspects of this situation and intends to pursue the matter further and report by letter to the Commission.

APPENDIX A: CLIPPING SERVICE

1. EPA Announces Plans to Retain Tropospheric Ozone Standard
August 10, 1992; 57 Federal Register 35542

EPA has published in the Federal Register its August 3, 1992 proposed decision not to revise the National Ambient Air Quality Standard (NAAQS) for tropospheric ozone at this time due to insufficient scientific information. EPA will continue to review new health effects to determine whether future revisions in the standard are warranted. EPA scheduled a hearing for September 1, 1992 in Washington D.C. Comments on this proposed decision must be received by EPA by October 9, 1992.

2. EPA Announcements Regarding Environmental Releases of Toxics

EPA announced that U.S. industries released 4.8 billion pounds of toxic chemicals into the environment in 1990. Toxic chemical releases in 1989 totalled 5.7 billion pounds; for 1987, when the Toxics Release Inventory (TRI) was first published, the figure was 7 billion pounds. Releases to air in 1990 totalled 2.2 billion pounds, down from 2.5 billion pounds in 1989 - 14% decrease. Toxic releases to land decreased by 3% from 454 million pounds in 1989 to 440 million pounds in 1990. Toxic releases to water, however, increased by 4 million pounds (2%) in 1990, as compared to 1989. Ammonia is the toxic chemical most released to the environment, followed by toluene, methanol, hydrochloric acid and acetone. The five states releasing the most to the environment in 1990 were Louisiana (209 million pounds), Texas (179 million pounds), Indiana (160 million pounds), Tennessee (153 million pounds), and Ohio (142 million pounds). The TRI, which is updated annually, is required under Section 313 of the Emergency Planning and Community Right-To-Know Act. Manufacturers with more than ten employees supply EPA and certain stage agencies with annual release data for more than 300 chemicals in twenty categories.

3. Radionuclide Major Source Definition

Section 112(a) of the Clean Air Act defines a major source as any source that emits 10 tons or more per year of hazardous air pollutant (HAP) or 25 tons or more per year of any combination of HAPs. The ton quantities are inappropriate for radionuclides, as very small emissions of radionuclides may be extremely hazardous. EPA will, thus, establish different criteria for radionuclides.

Notice of proposed rulemaking is due in July of 1992.

4. Hazardous Waste Management System; Identification and Listing of Hazardous Waste: Used Oil

EPA has decided to preserve the status quo for used oil destined for disposal. The Agency will not list used oils destined for disposal as hazardous waste, based on the finding that all used oils do not typically or frequently meet the technical criteria for listing a waste as hazardous waste. However, these waste oils remain subject to regulations under the Resource Conservation and Recovery Act, which set the technical criteria to determine whether a solid waste should be listed as hazardous waste.

This action is final.

5. Burning of Hazardous Waste in Boilers and Industrial Furnaces

EPA established emission standards for boilers and industrial furnaces that burn hazardous waste fuels in order to control emissions of toxic organic compounds, toxic metals, hydrogen chloride, chlorine gas, and particulate matter. In addition, this rule subjects owners and operators of these devices to the general facility standards applicable to hazardous waste facilities.

Final Rule effective August 1991.

6. Air Emissions Standards for Volatile Organics

EPA proposes air emission standards for emissions of volatile organics from tanks and impoundments at hazardous waste facilities. The standards would require that organic emission controls be installed and operated on the tanks, surface impoundments, containers, and certain miscellaneous units if any hazardous waste having a volatile organic concentration equal to or greater than 500 ppm by weight is placed in the unit.

The final rule is due in January 1993.

7. Disposal of Sewage Sludge

EPA proposes technical requirements for the final use and disposal of sewage sludge when landfarmed, sold, monofilled, surface disposed, or incinerated. Related computer programs and background documents are listed. The standards will be expanded and revised as information becomes available.

The final rule is due in August 1992.

8. National Ambient Air Quality Standards - Sulfur Oxides

EPA proposes to retain the existing NAAQS for sulfur oxides. Adding an alternative 1-hour primary standard of 0.4 ppm to replace the 3-hour standard (0.5 ppm) is being considered. EPA also proposes to revise the significant harm levels, the pollutant standards index for SO_2, and certain monitoring and reporting requirements.

Final rule action is indefinite. The rule is under discussion at upper levels.

9. Chromium Industrial Cooling Towers

Chromium compounds are listed as hazardous air pollutants in the Clean Air Act Amendments of 1990. Industrial process cooling towers that use chromate-based water treatment programs have been identified as potentially

significant sources of chromium air emissions and as a source category for which National Environmental Standards for Hazardous Air Pollutants were warranted.

The notice of proposed rule making is due in April of 1993. The final rule is due in April of 1994.

10. Nitrogen Oxides

EPA announces the availability of an external review draft of a revised air quality criteria document of oxides of nitrogen prepared by the Environmental Criteria and Assessment Office of the Office of Research and Development.

Final Review of this document is scheduled by December 1992. Rulemaking action is due in 1993.

11. Carbon Monoxide

EPA will review ongoing studies on health effects of carbon monoxide and make a decision for or against a change in the National Ambient Air Quality Standard

Final criteria document is due in August of 1992.

12. Radionuclides

EPA sets standards for radionuclide emissions from several source categories including Department of Energy facilities, Nuclear Regulatory Commission licensees, uranium fuel cycle facilities, elemental phosphorus plants, coal-fired boilers, high-level nuclear waste disposal facilities, phosphogypsum stacks, underground and surface uranium mines, and uranium mill tailings operations.

The final rule of December 1989 is effective immediately.

13. Lead

EPA is assessing new health effects information that has become available regarding lead and will make a decision for or against a change in the National Ambient Air Quality Standard. EPA has prepared a staff paper which has been reviewed and approved by the Clean Air Act Scientific Advisory Committee.

A notice of proposed rulemaking is due in 1993.

14. Compliance Extensions for Early Reductions of Hazardous Air Pollutants

EPA proposes to implement provisions in the Clean Air Act to allow an existing source to obtain a six-year extension of compliance with an emission standard if the source has achieved an emission reduction of 90 percent or more of hazardous air pollutants by certain dates specified in the Act.

Final action is due in December 1992.

15. Ambient Air Quality Surveillance

EPA proposes to revise the ambient air quality surveillance regulations to include provisions for enhanced monitoring of ozone and nitrogen oxides and additional monitoring of VOCs and meteorological parameters. The revisions would require states to establish photochemical assessment monitoring stations as part of their State Implementation Plan monitoring network in ozone non-attainment areas.

The final rule is due in September 1992.

16. Standards for Tank Vessel Loading Operations

This regulation will control the volatile organic carbon (VOC) emissions from tank vessel loading operations. Approximately 65,000 megagrams of VOCs are emitted annually from tank vessel loading operations.

Notice of proposed rulemaking is due in December 1992. The final rule is due in December of 1993.

17. Guidance for Implementation of Modifications

Guidance is being developed in accordance with the Clean Air Act Amendments of 1990 that will set de minimis levels for 189 listed hazardous air pollutants and established relative toxicity ranking for determinations of offsets.

The final rule is due in May of 1993.

18. CFCs From Vehicle Air Conditioners

EPA proposes requirements for servicing of motor vehicle air conditioners and restrictions on the sale of CFCs under 20 pounds. EPA would require that only approved equipment be used to perform service, and proposes standards for approval of recover/recycle equipment and "recover only" equipment.

The final rule is due in July of 1992.

19. Stratospheric Ozone - CFC Safe Alternatives

EPA will: (1) make unlawful the replacement of any CFC with a substitute that may cause adverse effects, (2) establish a process for publishing a list of safe and unsafe alternatives, (3) publish guidance on petitioning to add or remove a substance from the list, and (4) establish a program for submission of health and safety studies on substitutes.

Notice of Proposed Rulemaking is due in August of 1992. The final rule is due in November 1992.

20. Definition of Term - High-Level Radioactive Waste

The states of Washington and Oregon request that the Nuclear Regulatory Commission revise the definition of "high-level radioactive waste" so as

to establish a framework and standards by which to determine whether reprocessing waste stored at the Department of Energy's Hanford site, is high-level radioactive waste.

Rulemaking decision date undetermined.

21. Incineration of Low-level Radioactively Contaminated Waste Oil from Nuclear Power Plants

The Nuclear Regulatory Commission proposes to amend its regulations to permit the on-site incineration of slightly contaminated waste oils generated at licensed nuclear power plants. EPA requests of NRC clarification of two issues: (1) the responsibility of NRC's licensees complying with the approval requirements of the Clean Air Act, and (2) the potential need for licensees obtaining state of federal hazardous waste permits.

Final rule on hold indefinitely until consensus-building process is complete.

22. Marine Pollutants

RSPA proposes to list and regulate, in all modes of transportation, materials listed as marine pollutants by the International Maritime Organization.

The final rule is due in January of 1993.

23. Experimental Use Permit Rule for Microbial Pesticides

EPA will propose to amend its experimental use permit regulations for pesticides to clarify the circumstances under which a permit is presumed not to be required and to specify that the presumption is based on a risk. EPA will also propose to require notification before initiation of small-scale testing of certain genetically modified microbia pesticides.

Notice of Proposed Rulemaking is due in August of 1992.

24. Mercury Contamination in Lake Champlain

University of Vermont and State University of New York, Plattsburgh scientists released a report, which indicates that mercury is widespread in Lake Champlain sediments. The report shows a fairly consistent, low level of mercury throughout much of the lake. The contamination is of concern. In addition to mercury, the report provides data from thirty sites around the lake on other toxic pollutants: zinc, cadmium, chromium, arsenic, silver, lead, copper, nickel, and other toxic pollutants such as PCB's.

Nearly two-thirds of the sites exceed a federal value for mercury used the judge to toxicity of sediments. Sixteen sites exceed a federal value for lead. Information on the other contaminants will be reported at a later date.

A sufficiently high level of mercury was found in Lake Champlain walleye fish to warrant the Vermont Health Department officials to issue a Health Advisory. It recommends that pregnant women and children not consume the fish. It is not certain, however, that the mercury in the fish is coming from the sediments.

Further studies are planned to better understand the nature and sources of toxic pollutants in the lake.

25. Auto Emissions Testing

On July 13, 1992, the U.S. Environmental Protection Agency released overdue regulations for testing auto emissions in certain metropolitan areas of the United States. Under the 1990 Clean Air Act Amendments, EPA was to specify by November 15, 1991 the requirements of programs to check auto exhaust systems. These programs are commonly referred to U.S. Inspection/Maintenance (I/M) and enhanced I/M. The Basic program is required in areas with marginal and moderate air quality problems. The enhanced program, as the name implies, is a much more comprehensive and effective program and is required in areas classified as serious, severe, or extreme, as well as in major areas throughout the northeastern United

States that meet the air quality standard but may contribute to the regional ozone problem.

26. EPA Announces Lawn Mower Trading Program

On August 6, EPA, in conjunction with the Edison Electric Institute, announced the establishment of a new consortium to promote the manufacture and use of lawn mowing equipment that should reduce air pollution.

In return for old, gasoline-powered mowers, electric utilities through the National Consortium for Emissions Free Lawn Care - will provide 1,000 residential customers with cordless electric mowers. The turned-in gasoline mowers will be given to EPA for emissions testing. The consortium will also evaluate, document, and promote methods for reducing emissions from engines used in lawn and garden equipment.

Based upon EPA's recent non-road engine study, it has been determined that lawn and garden equipment contributes 4% of the total VOC inventory in non-attainment areas. This is significant relative to the emissions from several categories of small stationary sources such as dry cleaners (1.15%), asphalt paving operations (0.87%) and bakeries (0.23%).

It has been further estimated that the 83 million lawn mowers in this country produce as much air pollution as 3.5 million motor vehicles; using a gasoline-powered mower for one hour generates as much pollution as a car emits driving 50 miles.

In promoting the use of electric lawn mowers, both EPA and the electric utilities have noted that the cost of such a mower is approximately $400.00, which is about equal to that of a high-quality gasoline mower; the average life of an electric mower is seven years, compared to the six-year life of a gasoline mower. In a typical mowing season, the cost of gasoline to operate a gasoline mower is approximately $8.50; the cost of the electricity needed to operate a cordless electric mower is approximately $3.50.

27. Great Waters Program

The Great Waters Program, mandated under Section 112(m) of the 1990 Clean Air Act is currently focusing on drafting the 1993 report to Congress, which will describe the present state of knowledge on the environmental health of and threats to the Great Waters. Teams of experts are preparing supporting documents that will serve as the basis for the report. The report, as currently envisioned, will be short and easy to understand, using graphics to convey much of the information. The report will address the five main questions posed by Section 112(m):

1. What is the pollutant loading from the atmosphere relative to the total loading?

2. What are the human health and environmental effects of those pollutants?

3. What are the sources of those pollutants?

4. Do the atmospheric loadings contribute to violations of water quality criteria or standards? and

5. What Federal regulatory revisions are necessary to prevent any adverse effects?

For each of these five questions, the report will describe the current knowledge on the topic, what conclusions can be reached with available information, what information is still needed, how that information may be obtained, and what progress is being made to collect this information. The report will be available after submittal to Congress in November 1993.

28. Report from Canada cited from Journal of Air & Waste Management Association

New Brunswick and Ottawa renew acid rain agreement. The federal and New Brunswick governments have signed a new agreement committing the province to a further reduction in sulfur dioxide emissions contributing to acid rain. The new accord, which will expire December 31, 1999, replaces the

previous document signed in 1987. It extends the SO_2 emissions cap for New Brunswick over the 1994-2000 period and sets a new SO_2 emissions limit of 175,000 tonnes per year, to be reached by December 31, 1994. This is a reduction of 10,000 tonnes per year from the limit set by the previous pact. For the federal government, it marks a first step in meeting Canada's commitments under the Canada-U.S. Air Quality Accord to keep SO_2 emissions in eastern Canada below 2.3 million tonnes over the period from 1992 to 2000. Similar agreements are also being negotiated between Ottawa and the other provinces east of Saskatchewan to reduce SO_2 emissions and ensure that maximum levels are not exceeded for the rest of the decade. As part of its effort to meet the new emission limit, New Brunswick will negotiate SO_2 emission reductions with owners of emission sources in the province, and will help the federal government evaluate the extent to which the U.S. needs to reduce SO_2 emissions in order to protect sensitive areas in New Brunswick. In turn, Canada will support research on clean coal combustion technologies. It will continue to research the impacts of acid deposition, and will sponsor programs to control acid rain-causing pollutants.

29. News Release

Fredericton, New Brunswick - Environment Minister Jane Barry announced on September 8, 1992 the coming-into-force of the Ozone Depleting Substances Regulation under the Clean Environment Act. The Regulation provides for extensive controls on the use of chlorofluorocarbons, halons, carbon tetrachloride and methyl chloroform, substances which destroy ozone in the stratosphere.

Under the provisions of the Regulation, only certified technicians will be permitted to handle ozone depleting substances and related equipment. There will be strict procedures for the handling and disposal of these chemicals to prevent release to the atmosphere. After October 31, 1992, all ozone depleting substances will have to be recovered and either reused, recycled or destroyed when equipment is serviced, noted Barry. There are currently no ozone depleting substances manufactured in New Brunswick.

"All equipment currently containing ozone depleting substances in New

Brunswick may remain in use, until alternative substances and appropriate destruction methods are developed. Regular leak testing and rigorous controls to prevent loss to the atmosphere will be instituted and enforced."

After March 31, 1993, all technicians who service equipment using ozone depleting substances will have to pass a one day training course in environmentally-safe practices. The Department of the Environment will be delivering these courses across New Brunswick starting this fall.