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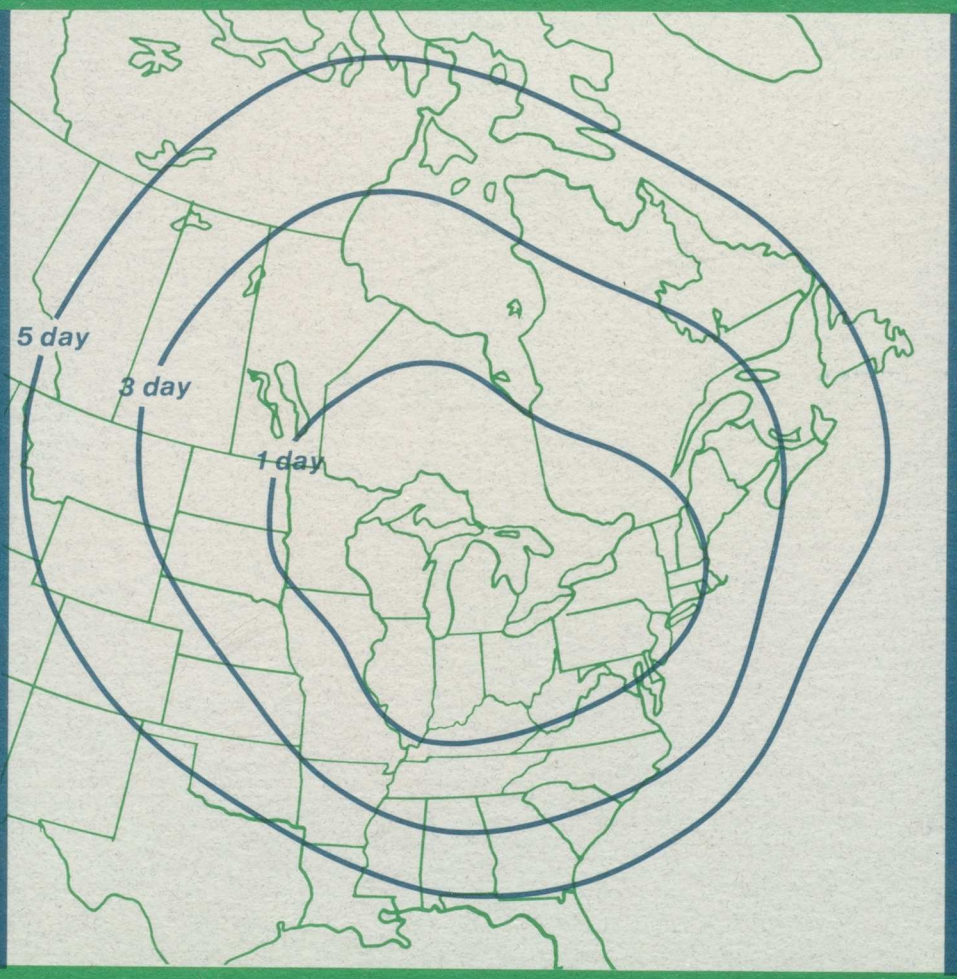
International Air Quality Advisory Board

Progress Report Fifteen to the International Joint Commission



Airshed of the Great Lakes

April 1993

IAQAB
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International Joint Commission
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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.

PROGRESS REPORT 15

to the

INTERNATIONAL JOINT COMMISSION

by the

INTERNATIONAL AIR QUALITY ADVISORY BOARD

for consideration at the

ANNUAL MEETING

April 1993

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1. DETROIT-WINDSOR/PORT HURON-SARNIA FOLLOW-UP

a. The Plan

A comprehensive plan has been developed by the Board to relay to the Commission a summary of the current status of air quality clean-up and assessment efforts in the Detroit-Windsor/Port Huron-Sarnia region, to assess the adequacy of this plan, and to determine residual risk from remaining air quality problems in the region. An outline of the Board's plan including responsible members and an approximate timetable is as follows:

I. Ongoing Action

1. Obtaining an emission inventory for the Detroit-Windsor/ Port Huron-Sarnia area. Fall 1993

2. Compilation of a listing of U.S./Canadian pollution reduction actions. (This will include an estimate of tonnes of pollutants reduced already, as well as existing and near-term plans). Fall 1993

3. Determination of the effectiveness of planned and current actions expressed quantitatively (e.g. as a percentage). Progress Report Fall 1993 - Final Report Fall 1994

4. Assessment of the scientific quality of databases. Fall 1993

5. Assessment of future control requirements. Fall 1994

II. Review of Current Activities

1. Compilation of a list of workshops, reports and plans that recently addressed research and development needs for assessing risks to the population of this area following full imposition of recent control efforts. Draft Report Fall 1993 - Final Report Spring 1994

2. Review of the ongoing actions discussed in (I) and Board compilation of priority needs. Spring 1994

b. Status of Current and Near-Term Actions

Response to the Detroit-Windsor/Port Huron-Sarnia Air Quality Board report, issued on February 4, 1991, has been different in Canada and the U.S. In Canada, the Province of Ontario has launched a comprehensive program to study the health impacts of airborne toxic

substances, while the U.S. has conducted studies emissions and imitated some regulatory actions.

b1. Canada/Ontario Summary

Subsequent to the release on February 4, 1991, of the Detroit-Windsor/Port Huron-Sarnia Air Quality Board Report, the Ontario Ministry of the Environment launched the first of its "Cities of the Nineties" studies in the Windsor area.

This study was designed to assess the health impacts due to airborne toxics in the Windsor Area. It was to include (1) ambient monitoring for specific compounds known or suspected to be toxic; (2) emission inventory compilation and mathematical modelling of long-term concentration fields; and (3) risk assessment based on the monitoring and modelling activities.

The Ministry of the Environment and Energy* for Ontario intends to release the full scientific report by early fall 1993.

At the same time as the scientific work has been under way, Mr. D. McTavish, Director of the Southwestern Region, has been chairing the Abatement Strategy Advisory Committee (ASAC), a "public" committee which will deal with the issues of abatement resulting from the release and findings of the scientific work. This committee has members from industry, academia, governments (federal and provincial), special environmental concern groups, news media and the public at large. The objectives of the ASAC committee are to:

(1) Develop an abatement strategy for the Windsor airshed; and

(2) Handle public communications aspects (keeping the public informed of progress through open houses, informative brochures, newspaper articles, etc.).

The real work of the committee will begin after the publication of the scientific findings in the fall of 1993. To date the committee has met six times and has primarily been a communication and education forum for the scientific study.

In examining the International Joint Commissions' report "Air Quality in the Detroit-Windsor/Port Huron-Sarnia Region", released February 1992, there is some concern with respect to the necessity of Recommendation #15. This recommendation suggests that phosgene gas is a concern when chlorinated organic materials are incinerated. There appears to be little evidence of this gas being generated as a byproduct of incineration in the report study area.

* On February 3, 1993 the Ministry of Environment and the Ministry of Energy were merged to become the Ministry of Environment and Energy

Activities to Date (March 1993)

Monitoring:

- Addition of two toxics monitoring stations to the network.
- Surveys by the mobile air monitoring system Trace Atmospheric Gas Analyzer (TAGA) in August and September 1991, and August and October 1992.
- Personal exposure monitoring in the summer of 1991, and in the winter and summer/fall of 1992.
    - 12 volunteers
    - sampling for various toxic VOCs (such as benzene, butadiene, formaldehyde) and trace metals
    - portable samplers, as well as indoor sampling at the home and office
- Collection and analysis of soil and local produce samples.

Emissions Inventory:

- Emissions questionnaires distributed to more than 100 local industries.
- Improvement of the area source emissions inventory (vehicles, dry cleaners, other small sources).
- Collaboration started with Wayne County Air Pollution Control Division to improve Detroit emissions data.

Modelling:

- State-of-the-art dispersion models have been selected for use in Windsor.
- Preliminary model validation has been carried out, industrial sectors contributing to airborne toxics of most concern have been identified.
- California multipathway model is being applied to estimate impact of local air emissions on other exposure pathways (i.e., other than inhalation).

Risk Assessment

- Various approaches to risk assessment and presentation are being explored.

- Data are being gathered on exposure of target chemicals via pathways other than inhalation.

- Toxics of top concern in the airshed have been identified.

Emissions Abatement:

- Multistakeholder abatement group has been formed at the February 1992 Open House in Windsor.

- Six meetings of this group have been held.

Public Information:

- Communications plan has been developed.

- Open House was held in Windsor in February 1992, for presentation of preliminary results, and formation of Multistakeholder Abatement Advisory Group.

- Second Open House took place on March 4, 1993, for an update on the results and a progress report from the Abatement Advisory Group.

Airborne Toxics Monitored in Windsor:

Chlorinated Solvents	Methylene Chloride Perchloroethylene Trichloroethylene
Common VOCs	Benzene 1,3-Butadiene Carbon Tetrachloride Chloroform Formaldehyde
Trace Metals	Arsenic Beryllium Cadmium Chromium Lead Manganese Mercury Nickel
Organics/Chemical Production and Reactions	Acrylonitrile 1,4-Dichlorobenzene 1,2-Dichloroethane Ethylene Dibromide Vinyl Chloride

Polycyclic Aromatic Hydrocarbons (PAHs; including Dioxins, Furans and PCBs)	Chlorinated Dibenzofurans Chlorinated Dioxins Chlorobenzenes Chlorophenols Polychlorinated Biphenyls Coke Oven Emissions Total PAHs Benzo(a)anthracene Benzo(a)pyrene Benzo(e)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(ghi)perylene Chrysene Dibenzen(a,h)anthracene Indeno(1,2,3-cd)pyrene Pyrene
Miscellaneous	N-Nitrosodimethylamine
Glycol Ethers	Ethylene Glycol Ethyl Ether Ethylene Glycol Ethyl Ether Acetate Ethylene Glycol Butyl Ether Ethylene Glycol Butyl Ether Acetate

b2. Summary of U.S.Region V Actions

Issue 1. Wayne County has been in nonattainment for PM-10 since November 1991. The Region will impose sanctions on Michigan if the state fails to submit a State Implementation Plan by June 17, 1993, detailing how it will correct the deficiency.

The Region finalized rules in June 1992 to control PM10 from the iron and steel industry and has been actively enforcing these regulations.

In 1991, the Region proposed sulphur dioxide (SO_2) nonattainment for Wayne County, Michigan. The Department of Natural Resources indicates they could meet attainment. The Region is awaiting the revised State Implementation Plan describing how the state plans to maintain attainment.

Issue 2. Region 5 conducted an air toxics study in the target area in 1990. The study results showed that mobile sources accounted for 84% of the 90,000 tonnes of air toxics released from this area during 1990 (Toxic Release Inventory (TRI) data). According to the TRI data for a three county area around Detroit, air toxics released have declined since 1987.

Issue 3. The Greater Detroit Resource Recovery Incinerator, designed to receive up to 4,000 tonnes/day of municipal waste, demonstrated compliance with all emission limits except those for mercury. Michigan was ordered to replace the Electro Static Precipitators with a spray drier/fabric filter system and add a limestone storage and handling system. Results of performance tests of the newly retrofitted incinerator are pending.

Issue 4. The Genessee Power Station Limited Partnership has proposed to construct a 35-megawatt wood waste fired steam/electric generation plant in Genessee County which would burn construction waste from the Detroit and Flint areas.

Issue 5. Under new EPA Vehicle Inspection and Maintenance regulations, Michigan is required to "fix-up and expand" the Detroit program.

2. LAKE SUPERIOR

a. Review of Great Waters Workshop

During the International Conference on Great Waters (including the Great Lakes) held in Durham, N.C. in November 1992, a series of conclusions and recommendations were presented which are relevant to the objectives of the IJC. The first fifteen deal with "Exposure and Effects". These emphasize the widespread impacts of toxics on humans and other living beings both directly and through the food chain. In particular, the participants emphasize that there may be impacts on humans in end points other than cancer, and that these other possible impacts should be identified and researched. It is clear that the emphasis of the effects conclusions dove-tail with the Commission's emphasis on "Virtual Elimination and Zero Discharge".

Of greatest interest to the activities of the IAQAB are the conclusions and recommendations in the sections on Relative Loadings and Source Identification. If releases to the atmosphere are reduced, the response of loadings of non-persistent chemicals will be rapid; but for persistent chemicals, already widely dispersed in the environment, the response delay could be years or even decades. Chemicals cycle between air, solid and water and are modified by conditions in each medium. Finally, the conference confirmed the IAQAB contention that "pollutants are transported long distances in air and contaminate remote areas, as evidenced by lack of alternate sources."

Source identification is highlighted in the conclusions since this is needed for rational control measures. The main attention is directed towards improvement in existing inventories of toxics releases. Since at present, only a limited number of toxic substances are inventoried, these activities should be expanded to include other toxic substances of concern. These inventories should be harmonized nationally and internationally, and easily accessible databases ought to be established. The need for air chemistry and transport modelling research completes the recommendations for providing pollution control officials with the tools to decide how to reduce toxic and other pollution sources to the Great Waters.

Despite the recognition by scientists of the importance of airborne deposition to the Great Waters, the financial support to atmospheric monitoring and research has not been recognized at the governmental appropriation level, especially in Canada. In many cases atmospheric deposition to Lake Superior provides the main source of toxic pollution, yet this appreciation has not been translated into the necessary resources to identify the source-receptor relationships needed for developing reasonable control policies.

b. **Sources of Deposition**

Efforts to estimate the deposition of toxic substances to Lake Superior continue in both Canada and the United States. There are two approaches: using monitoring data augmented by theory and extrapolation from land to water; and modelling using emission information, airborne transport, and deposition. We present below an illustrative U.S. modelling result of Terry Clark of NOAA/EPA for the heavy metals lead, chromium, and cadmium, using a 1985 emission inventory for Canada and U.S.

The region between Chicago and St. Louis and a bit farther southwest appears to be a major source for all three metals. For some lead calculations, even the southeast Texas and Louisiana regions contribute a disproportionate fraction of the lead, considering their great distance from Lake Superior. Similarly, for lead and chromium, the Montreal area also falls into the unexpectedly high contribution category.

The model has predicted the deposition of these heavy metals to the lake and its drainage region. The deposition estimates have not been reported because the cadmium total deposition numbers disagree with some recent observations of wet deposition to Lake Superior by a factor of about 10; the lead deposition is probably misleading due to the preliminary nature of this inventory. The discrepancy in the cadmium deposition to the lake probably results from a single error over the entire geographical domain. This uncertainty in emissions reflects the urgent need to improve the emission inventory of all toxic pollutants.

The implication of significant contributions of airborne deposition to Lake Superior of these heavy metals from regions as remote as Louisiana and Montréal emphasizes the need for national and international rather than purely local measures to control emissions.

In its Fall Report to the Commissioners, the IAQAB will provide a further assessment of the adequacy of the ongoing programs to estimate deposition to Lake Superior.

3. VIRTUAL ELIMINATION STATUS REPORT

The Virtual Elimination Task Force is in its final stage of preparing a report on the subject. The report will be distributed for review in early April. Public consultation meetings are scheduled for April 27, 28 and 29 in Milwaukee, Detroit and Toronto, respectively.

The report:

- presents a conceptual framework for a Virtual Elimination Strategy.
- presents an evaluation of the various elements comprising the strategy.
- examines the strategy in three case studies. PCB, lead and mercury were selected for these studies. Much of what was learned from these studies is applicable to other persistent substances.

The Virtual Elimination Strategy, which cannot be limited to the Great Lakes Basin, is a result of extensive deliberations among its multidisciplinary membership; consideration of other initiatives; information developed by contractors, Commission staff, workshops and surveys.

The IAQAB will provide a review of the Task Force report at the semi-annual meeting in September.

4. TOXICS IN THE URBAN ENVIRONMENT

Societal concerns about hazardous substances are significant within the Great Lakes region and other transboundary locations between the U.S. and Canada. The scientific issues are associated with chemicals and other hazardous substances released into all media. Those emitted into the air can be directly inhaled, and/or be deposited on the surface of the earth. The latter will come into contact with humans through the water, soil, or food. For some classes of chemicals, e.g. volatile organic compounds (VOCs) and arsenic, the emissions and accumulation are primarily in the atmosphere. However, they can be present in the soil and ground water due to spills and leaky underground storage tanks. Other hazardous substances, such as lead, mercury, and polycyclic aromatic hydrocarbons (PAHs), have more complicated patterns of accumulation and exposure due to their release by a variety of stationary or area emission sources, and their documented persistence in one or more media. Issues concerning toxic substances in the environment have been associated with legacies from past industrial practices, or current releases of toxic substances into, for instance, the atmosphere by particular types of stationary, area and mobile sources. Because of the impending changes in the types of cars used by the general public, a major concern for the remainder of the 1990s will be the prevention of significant releases of hazardous substances from combustion and evaporative emissions by cars that are associated with new and reformulated fuels. These fuels are currently being considered or used as part of the strategy to reduce carbon monoxide (CO) and/or ozone levels. The release of fuel related chemicals and by-products can affect large segments of the population in both major and minor population centres since all rely on the automobile and the practices which can increase human contact.

From the stand point of the U.S., the Clean Air Act of 1990 has a section called "Title III. Hazardous Air Pollutants". It lists 189 substances which must be considered for regulation by the EPA. The intent here is to reduce or eliminate the concentrations of these materials emitted into the environment by various sources. The express purpose is to reduce exposure and risk within the general population. A major concern to the research and monitoring community is the lack of data on the current levels of all these hazardous substances in the urban environment. There are monitoring programs which can provide either long term or short term data bases on a limited set of these hazardous substances (e.g. elemental lead, benzene, trichloroethylene), but for the most part the knowledge base is weak, and/or non-existent.

An interesting example is the case of methyl tertiary butyl ether (MTBE). It was introduced in the U.S. as a major oxygenate constituent of gasoline (15% by volume) this past winter, and is now the single most widely produced chemical in the world. The

5. AUTOMOBILE ISSUES

a. Reid Vapour Pressure

In Canada, five provinces and one region regulate the Reid Vapour Pressure (RVP) of gasoline. Ontario, Quebec, Nova Scotia, New Brunswick and Newfoundland have set a maximum RVP of 10.5 psi (72 kPa) during the summer. The Greater Vancouver Regional District in southern British Columbia has set a summertime maximum RVP of 9.0 psi (62 kPa).

In California the summertime RVP limit is 7.8 psi, while in the rest of the U.S. it is 9.0 psi. California plans to reduce the limit even further to 7.0 psi by 1996. The U.S. is also planning to phase in a program to limit benzene in gasoline to 1% by volume over the period 1995-1997 (California has an accelerated program over the period 1992-1996).

The benefit of limiting RVP in gasoline is that the reduced volatility results in lower emissions of volatile organic compounds (VOCs). VOCs, along with nitrogen oxides (NO_x), react in the presence of sunlight to form ground-level ozone ("smog"). Smog has a harmful effect on human health and agricultural productivity.

The federal and provincial governments of Canada have developed a program called the NO_x/VOCs Management Plan, which proposes a series of initiatives to reduce the emissions of NO_x and VOCs. The provincially-led RVP initiative (V602) proposed a further reduction of the maximum RVP of gasoline to 9.0 psi. in the three Canadian ozone nonattainment areas: the Lower Fraser Valley in British Columbia, the Windsor-Quebec City Corridor, and the South Atlantic Region. The RVP initiative would reduce VOC emissions by 49 kilotonnes/year by 2005. This reduction accounts for 15% of the total reductions to be obtained by VOC source control initiatives. It also limits VOC emissions during the summer when ozone concentrations are the highest.

To reduce RVP, the gasoline must be formulated differently than it has been in the past. The likely method of limiting RVP is to reduce the amount of butane blending component. The average concentration of butane in Canadian gasoline during the summer of 1992 was 4.5% by volume.

One issue of concern is what will be done with the surplus butane, which may amount to 8% of Canadian exports of butane. Some of the surplus butane will be taken up by the petrochemical industry for the production of ethylene, propylene and other petrochemicals. However, most of the surplus butane will be consumed by the production of butane-based gasoline additive MTBE, which is an octane enhancer. Premium-grade gasoline sold by some companies in British Columbia and Ontario already has MTBE added. It is believed that the required production of MTBE will lead to an

increase in the demand for butane and will buoy the price of butane during the 1990s.

Several experiments in the U.S. have indicated that the addition of MTBE leads to a reduction in automobile exhaust emissions of NO_x, VOCs and carbon monoxide. The production of MTBE does, however, result in significant NO_x and carbon dioxide emissions. Thus the evaluation of the environmental benefits of the introduction of MTBE must include all aspects from production to its atmospheric impact.

A second issue of concern is the possible increase in emissions of benzene, a known carcinogen, that might result from the reformulation of gasoline to meet RVP limits. Benzene is found in Canadian gasoline at concentrations that range from 0.3 to 5.4% by volume. When butane is removed from gasoline, the relative proportion of benzene would be expected to increase, as would emissions of benzene. The increase in benzene emissions could be as large as 60-70 tonnes/year, or a 1% increase in Canadian emissions of benzene. Vapour control schemes would reduce this increase.

An experiment undertaken by the Auto/Oil Air Quality Improvement research program involving 20 automobiles and 11 fuels found that exhaust emissions of benzene would not change significantly if RVP were lowered, and the evaporate emissions from automobiles would actually **decrease**. The actual size of this decrease (if there is any) would vary depending on what refining processes are used and on what alternative additives are available when the gasoline is formulated.

In conclusions, controls on RVP will substantially aid in reducing VOC emissions. The resulting surplus of butane will probably be consumed by increased demand for butane as a feedstock for MTBE production. Although the net change in benzene would be small, it is not yet understood whether the reformulation of gasoline to reduce its RVP will increase or decrease benzene emissions.

b. Control of Automotive Air Pollution

North America's transportation needs are a major cause of air pollution. In the U.S., transportation is responsible for 30% of the VOCs, 40% of the NO_x and 70% of the CO emitted to the atmosphere annually. For Canada the percentages are 45%, 60% and 60% for VOCs, NO_x and CO, respectively. In 1990, road transportation in Canada contributed roughly 85% of the VOCs, 55% of NO_x and 70% of CO out of the total transportation emissions.

These pollutants are of concern because of their environmental and human health threats. CO is a colourless gas that passes through the lungs and enters the blood stream, where it reduces the blood's ability to deliver oxygen to vital tissues, affecting primarily the cardiovascular and the nervous system. NO_x is a brown coloured gas that aggravates respiratory illnesses. This family of gases are

chemically reactive in the atmosphere and threaten human health and the environment by forming smog, acid compounds, and other highly toxic pollutants. Next to SO_2, NO_x are the most significant contributor to acid rain. NO_x may also contribute to global warming and accelerate the degradation of a variety of materials. VOCs are a family of chemicals containing hydrogen and carbon. VOCs are a concern for a number of reasons; however two major concerns are for their role in the formation of smog, and for the toxicity of the individuals chemicals. Three chemicals of the family of VOCs which exemplify the concern for toxicity are benzene, 1,3-butadiene, and formaldehyde. These three chemicals are well documented as coming from motor vehicle exhaust. They are also chemicals documented to be known or suspected human carcinogens.

The vast majority of the air pollution from transportation comes from the operation of light duty gasoline powered motor vehicles. These vehicles make up most of the traffic on the road, and represent that part of the transportation sector which has grown the most. Figure 1 charts the growth in vehicles miles travelled in the U.S. The estimate for 1990 is that in the U.S. motor vehicles travelled over 2 trillion miles. This is double the miles travelled in 1970, the year when auto emission standards were first enacted. The early emission standards were not very stringent. From about 1975 to 1980, the standards were continually tightened. However, since 1980 the standards in the U.S. have remained unchanged. During this period of unchanged emission standards, travel by light-duty vehicle increased by 2.5 billion miles, and the less regulated truck segment grew by over 60%. This unprecedented growth worked to offset air quality improvements due to controls on motor vehicle-related air pollution. In Canada, from 1985 to 1990, the estimated emissions of NO_x and VOCs from road transportation decreased by 10 and 25% respectively, while CO increased by approximately 10%.

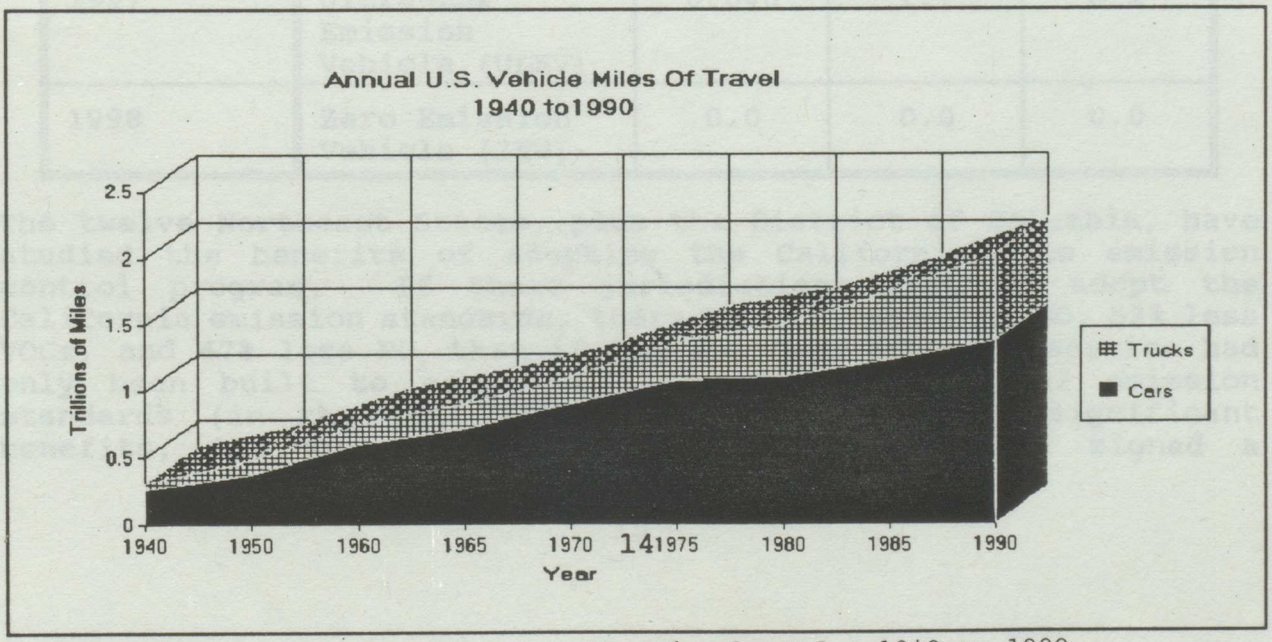

Figure 1. Annual Vehicle Miles Travelled in the U.S., 1940 to 1990.

The 1990 Clean Air Act Amendments does establish a new U.S. auto emission standard for 1994 and later model year vehicles. However, unlike past Congressional actions, this is not a new round of standards which become increasingly more stringent with time. It is a one time reduction. What Congress did do however, was to expand the ability of states to set auto emission standards. In the 1970 Clean Air Act, Congress prohibited all states, except for California, from setting emission standards. This was done to protect the auto manufacturers from the potential of being required to build cars to meet fifty different standards. With the 1977 Clean Air Amendments, in certain situations, Congress allowed states to adopt auto emission standards, provided they were identical to those of the state of California. In the 1990 Act, Congress expanded this provision, making it easier for states to adopt requirements for the less polluting California cars. This expansion provides states with a significant opportunity to reduce automotive-related air pollution.

The California program for controlling automotive-created air pollution is an aggressive, technology forcing program. This program establishes a set of standards which become increasingly more stringent with time (see Table 1), and introduces for the first time the concept of "Zero Discharge" to motor vehicles, with the introduction of electric vehicles starting in 1998 (2% of new car sales).

Table 1. California Auto Emission Standards, grams per mile

Year 1st Introduced	Category of Vehicle	VOCs	CO	NO_x
1994	Transitional Low Emission Vehicle (TLEV)	0.125	3.4	0.4
1997	Low Emission Vehicle (LEV)	0.075	3.4	0.4
1997	Ultra-Low Emission Vehicle (ULEV)	0.040	1.7	0.2
1998	Zero Emission Vehicle (ZEV)	0.0	0.0	0.0

The twelve Northeast States, plus the District of Columbia, have studied the benefits of adopting the California auto emission control program. If these jurisdictions were to adopt the California emission standards, there would be 61% less CO, 53% less VOCs, and 67% less NO_x than if the new cars entering service had only been built to meet the less stringent federal emission standards (in the year 2010). Because of these significant benefits, the jurisdictions of the Northeast have signed a

Memorandum of Understanding indicating their intent to adopt the California auto emission control standards. In addition to the added reductions of the pollutants CO, VOCs and NO_x, analysis indicates that adoption of the California requirements would result in less toxic air pollutants. In particular, these cleaner vehicles are estimated to result in over 50% less benzene, 1,3-butadiene, and formaldehyde then would otherwise come from motor vehicles. These three toxics are of note because they were identified as of interest to the International Joint Commission in their report on air quality in the Detroit-Windsor/Port Huron-Sarnia area.

An inspection and Maintenance (I&M) Program is under active consideration by the Ontario Ministries of Transportation (MTO) and Environment and Energy (MOEE). Current estimates indicate that a test only, centralized, state of the art I&M program would result in vehicle emission reductions of approximately 28% HC/VOC, 30% CO and 9% NO_x. Implementation of an I&M program would necessitate the revision of a) the Highway Traffic Act to require annual or biennial emission inspections prior to licence renewal, and b) O. Regulation 353/90 (formerly Reg. 311), which sets the acceptable emission limits for vehicles. Candidate locations for implementation of the I&M Program is also under consideration.

Based on the above, the IAQAB intends to study the air quality benefits in the border region of both countries adopting the California Low-Emission Vehicle Program, and will report to the Commission as soon as it completes its analysis.

6. GROUND LEVEL OZONE IN AND NEAR MONTRÉAL AND QUÉBEC

From time to time, the IAQAB has reported on elevated ground level ozone concentrations in the transboundary region. Among the various points which the IAQAB has emphasized to the Commission are the non-urban aspects- the transport from distant sources and the strong seasonality of elevated values, summertime values frequently exceeding not only the more stringent Canadian standard but even the U.S. standard. We thought that the commissioners might be interested in a paper entitled "Ozone Exposure in the Province of Québec, Canada" by Richard LeDuc and Claude Gagnon which appeared recently (December 1992) in MonitAir, a newsletter prepared under a Convention of Long-range Transboundary Air Pollution. Most of the MonitAir articles deal with conditions in Europe.

In both the Montréal and Québec regions there are many urban and "extra-urban" monitoring stations recording hourly ozone concentrations. Some of the "extra-urban" stations are a few hundred kilometres from the two cities. In general the urban stations observed higher concentrations than those of "extra-urban" stations but there is considerable variability in both sets of data; a few "extra-urban" locations report higher values than some urban sites. On average, the frequency of ozone concentrations exceeding 25 ppb as daily means in the "extra-urban" actually exceeds the same frequency in the urban stations.

Usually the warmest air in the two cities is associated with southerly flow, undoubtedly from the U.S. in the summer months. The authors find that the "highest mean ozone levels are associated with a southwest wind..." and "hourly exceedances are also wind direction dependant" since there are more than twice as many exceedances in a typical urban Montréal station with a south and southwest wind than for all wind directions.

Finally, in Figure 2., one notes how much greater is the mean ozone concentration in the 20 to 28°C range than when it is colder. Note that this figure and much of the above discussion treats averaged ozone values, and does not show peak values. The current standards deal with <u>peak</u> hourly values which, of course, are higher than the average ozone concentrations.

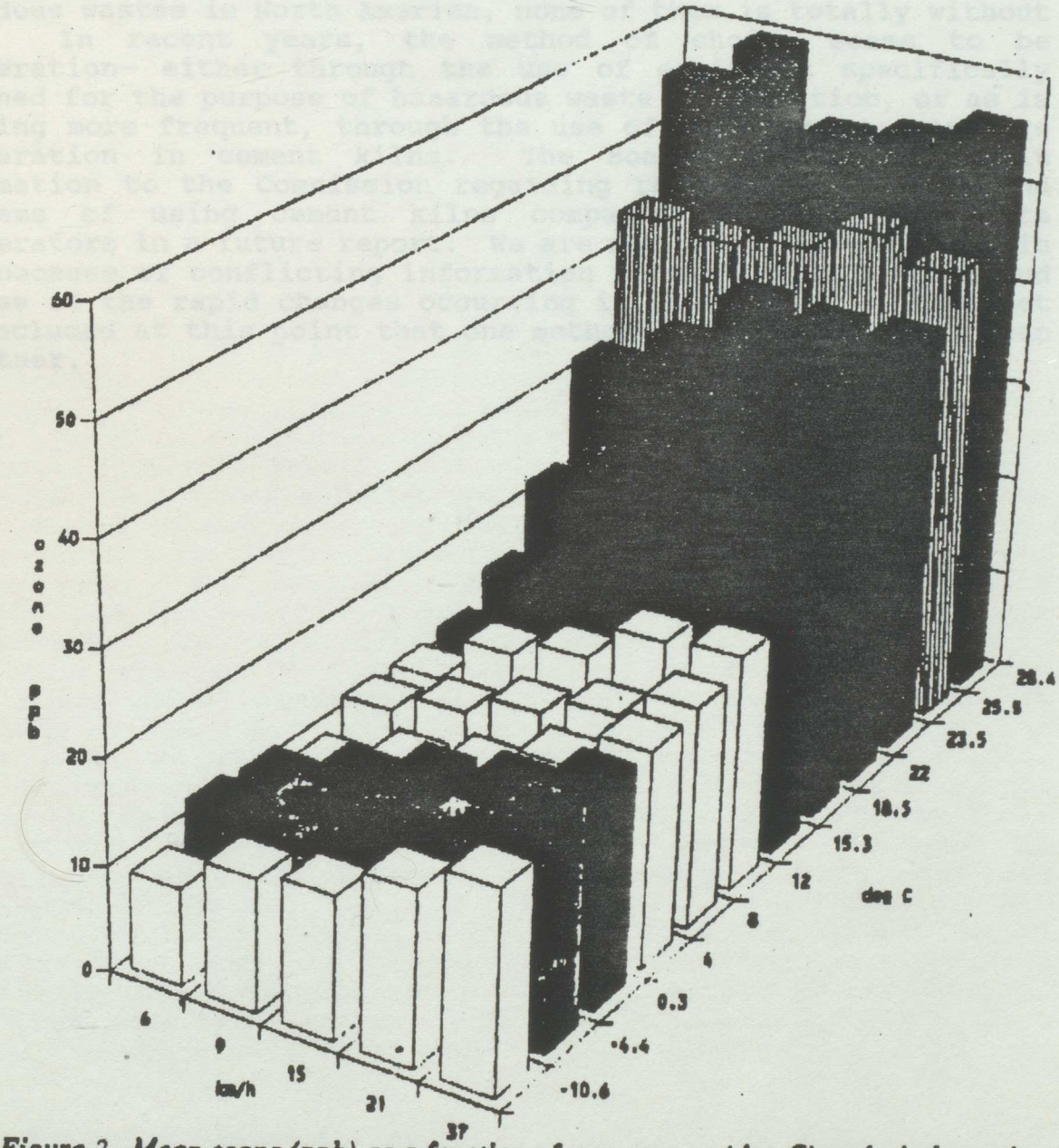

Figure 2. Mean ozone (ppb) as a function of temperature (deg C) and wind speed (km/h) at station 06049 (Montréal).

7. HAZARDOUS WASTE INCINERATION IN CEMENT KILNS

There are a number of methods currently available to dispose of hazardous wastes in North America, none of them is totally without risk. In recent years, the method of choice seems to be incineration- either through the use of equipment specifically designed for the purpose of hazardous waste incineration, or as is becoming more frequent, through the use of very high temperature incineration in cement kilns. The Board intends to submit information to the Commission regarding the relative merits and problems of using cement kilns compared to hazardous waste incinerators in a future report. We are not able to report at this time because of conflicting information received by the Board and because of the rapid changes occurring in this field. It cannot be concluded at this point that one method is better or worse than the other.

8. TOXICS RELEASE INVENTORY

a. Assessment of U.S. Inventory

The next tally of U.S. toxic releases to nation's air, land and water might be significantly inaccurate because of confusion over new reporting rules for the EPA's Toxic Release Inventory (TRI), environmental officials are warning. The problems stem from a long delay in publishing the latest TRI reporting form, which was issued without adequate reporting guidelines. TRI reports are required by the Comprehensive Emergency Planning and Community Right-To-Know Act and, until this year, the process worked well. Under a second law, the Pollution Prevention Act of 1990, the Environmental Protection Agency had to revise form "R" to provide for information on industry efforts to stem pollution. But the White House Office of Management and Budget (OMB), responding to industry arguments that much of the new information might be proprietary, spent eight months trying to block the EPA revisions. OMB finally approved a "compromise" form on May 19, 1992, which left less than a month for the 28,000 facilities affected by TRI requirements to figure out, fill out and submit their tallies on releases of 320 chemicals. Unfortunately, the compromise left many chemical engineers baffled by the form. For example, there is no definition of "waste stream", and there are no guidelines on reporting releases from accidents or remedial work. Because facilities were required to note their efforts at trimming releases of TRI chemicals, the overall picture of national waste output has been blurred. "It will take at least two years to shake out the data," says Steven Newburg-Rinn, an official of EPA's Information Management Division. "Lots of companies overreported in the past." Although EPA has not issued its report on 1991 releases, many state officials say their waste output is down. But "just how much of the drop is attributable to a sluggish economy or improved pollution prevention techniques is unclear," says Steve Hanna, head of California's Hazardous Materials Office. The next form "R" will also be expanded- this time, to provide for information on industry's progress in the 33/50 program, a voluntary effort to cut releases of 33 chemicals by 50 percent. The EPA is promising to provide a list of "common errors" with the new form, however.

b. Proposed Canadian Inventory

On March 10, 1993 Environment Canada released a report entitled "A National Pollutant Release Inventory for Canada". The report was prepared by a Multi-Stakeholder Advisory Committee, which had representatives from industry, environmental groups, labour, and the federal and provincial governments.

The report recommends the design and reporting procedures for a National Pollutants Release Inventory (NPRI), which will cover

APPENDIX A: CLIPPING SERVICE

a. U.S.A.

1. Protection of Stratospheric Ozone: Refrigerant Recycling-Proposed Rule

The Clean Air Act requires the establishment of a comprehensive program to limit emissions of ozone-depleting substances during their use and disposal. The EPA takes a major step in implementing this program by issuing proposed regulations aimed at reducing emissions of ozone-depleting substances to the lowest achievable level during the servicing and disposal of most air conditioning and refrigeration equipment. Ozone-depleting substances in this proposal include chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform and hydrochlorofluorocarbons (HCFCs). The specifics of the proposal can be divided into three main elements. First, persons servicing or disposing of air conditioning and refrigeration equipment would be required to observe certain service practices that maximize the recovery and/or recycling of ozone-depleting refrigerants. Second, the EPA is proposing to establish equipment and reclaimer certification programs. The reclaimer certification program would require reclaimers to return refrigerant to a certain purity level. Third, the proposal requires that ozone-depleting refrigerants be removed from appliances and machines before the final disposal of such equipment. The EPA is proposing various effective dates for different provisions of the regulations to allow sufficient lead time for affected industries to comply.

2. Burning of Hazardous Waste in Boilers and Industrial Furnaces

The EPA establishes 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.

Stay of final rule remains in effect until 2/18/93.

3. Toxic Chemical Release Reporting - HCFCs

The EPA proposes to add HCFCs as a category to the list of toxic chemicals subject to reporting.

Final rule 6/93.

4. Sulphur Oxides Standards

The EPA proposes to retain the existing National Ambient Air Quality Standard for sulphur oxides. Adding an alternative 1-hour primary standard of 0.4 ppm to replace the 3-hour standard (0.5 ppm) is being considered.

Final rule by 4/15/93.

5. Ozone Standards

As a result of a review of health and welfare criteria, the EPA proposes that revisions of the primary and secondary standards for ozone are not appropriate at this time. The criteria and supplementary materials will be published simultaneously with the issuance of this proposed decision.

Final decision by 3/93.

6. CO Standards

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

Decision on revision 11/93.

7. Compliance Extensions for Early Reduction of Hazardous Air Pollutants

The EPA implements revisions in Sect. 112(i)(5) of 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% or more of hazardous air pollutants by certain dates specified in the Clean Air Act.

Effective 12/29/92.

8. Requirements for the Enhanced Monitoring of Ozone and Ozone Precursors

The EPA proposes to revise the ambient air quality surveillance regulations to provide for enhanced monitoring of ozone and nitrogen oxides and additional monitoring of volatile organic compounds and meteorological parameters. The revisions would require states to establish photochemical assessment monitoring stations as part of their monitoring network in ozone nonattainment areas.

Final rule 4/93.

9. Incineration of Low-Level Radioactively Contaminated Waste Oil from Nuclear Power Plants

The Nuclear Regulatory Commission amends its regulations to permit the onsite incineration of slightly contaminated waste oils generated at licensed nuclear power plants without amending existing operating licenses and clarifies the licensees' responsibilities with regard to other applicable state or federal permits and requirements.

Effective 1/6/93.

10. PCBs - Commerce Exemptions

The EPA proposes to grant three and deny two petitions for exemption from the prohibition against the manufacture, processing, and distribution in commerce of PCBs. The EPA also proposes to amend the interim procedural rules to require submission of a certified letter at least six months prior to the expiration date of an exemption for which the petitioner wants the exemption to continue.

Final rule 6/93.

11. Assessing Female Reproductive Risk

The EPA proposes guidelines for assessing the female reproductive risk of environmental pollutants. The guidelines are intended to guide Agency analysis of data on female reproductive toxicants according to appropriate scientific standards.

Final guidelines 5/93.

12. Assessing Male Reproductive Risk

The EPA proposes guidelines for assessing the male reproductive risk of environmental pollutants. The guidelines are intended to guide Agency analysis of data on male reproductive toxicants according to appropriate scientific standards.

Final guidelines 5/93.

13. Toxic Release Inventory - Expanded Reporting Requirements

The EPA is considering an expanded list of chemicals that facilities will have to submit information on for the TRI. Also, the list of facilities required to submit such information may be

expanded. The EPA will selectively propose groupings of chemicals and industries to be added.

Notice of Proposed Rule Making 8/93.

b. Canada

1. Acid Rain

Recent information from Québec indicates they have reduced their SO_2 emissions by some 60% from 1980 levels to about 4000,000 tonnes per year, exceeding their original reduction commitments.

Noranda's smelter at Rouyn, Québec has completed the process of replacing its old reverbatory furnaces and has already reached its 1995 target of a 70% reduction in SO_2 emissions (base year 1980). Noranda is on target to reach 90% reduction by the year 2000.

3. Québec Regulation Respecting the Quality of the Atmosphere

This regulation contains the provincial ambient air standards as well as emission standards for industrial sectors and prescribed reference methods. Consultations on proposed amendments to the regulation are scheduled for early 1993. The main modifications being considered include VOC limits taken after the Montréal Urban Community provisions, point of impingement limits for about 450 substances, new emissions standards for incinerators and aluminum smelters and a new ambient SO_2 standard.

4. British Columbia/Washington State Environmental Cooperative Agreement

Arising from the British Columbia/Washington State Environmental Cooperative Agreement and the Canada/U.S. Air Quality Accord, Joint Air Pollution Control Workshops are providing a forum for information exchange and collaboration among neighbouring (air pollution control) jurisdictions. Discussions at the last meeting (September 10, 1992) concluded with five recommendations concerning air quality monitoring as well as for five recommendations concerning transboundary collaboration during reviews of permit applications for new projects and major sources. A common thread among a lot of the recommendations and issues identified for future workshops was to facilitate greater sharing of information and more cooperative regulatory efforts on transboundary air quality issues. The workshop format was successful and is expected to continue with further meetings in 1993.

5. The Clean Air Strategy for Alberta (CASA)

The Clean Air Strategy Report to the Minister was approved by government in 1982. CASA was directed to prepare detailed implementation plans for the high-priority recommendations of the Strategy. As a result, 15 Task Groups were formed and they have made varying degrees of progress preparing detailed implementation plans to cost-effectively achieve the CASA goals. These goals range from improving energy efficiency in the provincial fleet of vehicles to altering building codes and appliance standards, fuel switching in electrical generations, emission monitoring and the applications of economic-based policy instruments. The technical planning phase is now drawing to a close, and an operational plan will soon be submitted to review and approval.

The highest priority recommendation in the Strategy was to develop and implement a "Comprehensive Air Quality Management System". The System represents a substantial change and innovation in the way air quality issues would be handled in Alberta. An entirely new decision-making process is applied to evaluate and set priorities for such issues as air toxic monitoring, standard setting, point source controls, zone management of emission and market-based policy instruments.

6. Alberta Environmental Protection Enhancement Act

In Alberta new legislation to replace the existing Clean Air Act and other environmental legislation was developed in 1992 and is expected to be proclaimed into effect in the summer of 1993. This new "Environmental Protection and Enhancement Act" along with updated regulations includes a number of changes and innovative approaches to reflect public expectations with respect to environmental protection in the 1980s.

7. Contaminated Fuel

Arising from a May 1990 contaminated diesel fuel incident in Alberta, which resulted in "health problems" to mechanics servicing the failed diesel engines, the issues of contaminated motor fuel has received further attention in Alberta. The Alberta issues mirror concerns raised by the U.S. General Accounting Office with respect to 'Blending of Hazardous Wastes with Fuel Products' in 1991, and the 1989 media allegations that millions of gallons of toxic wastes are being illegally blended into gasoline, diesel and industrial heating fuels in the southern Ontario and U.S. Great Lake States area. When one considers that each year in Canada alone about 35,00 million litres of gasoline fuel and 17,000 litres of diesel fuel are utilized, the potential for undetected illegal fuel blending is significant. In addition, in 1992 in Alberta alone, more than 2 million litres of industrial fuel (made by

blending flammable materials such as used oil, contaminated fuels and solvents) were shipped to U.S. facilities for incineration/destruction and about 8 million litres per year of similar fuels are being utilized in Alberta asphalt plants as fuel.

Most investigations including some 200 motor fuel spot checks in Alberta in the Fall of 1992 have uncovered vary limited evidence of illegal fuel blending, but have not identified a widespread contaminated fuel problem.

8. Biomedical Wastes

New Brunswick recently compiled a successful tendering process to have the remaining 50-60% of its waste incinerated. Two publicly owned incinerators are located at regional hospitals in Fredericton and Edmundston. The Fredericton system is the most recent and meets the CCME emission guidelines. The Edmundston facility is being fitted with a new scrubber this year. The new, privately owned facility will be an expansion of an existing system near Moncton. The successful bidder, Mr. Shedding Waste Management Limited has registered its proposal under the Environment Impact Assessment Regulation. Once all required permits are obtained, the company will be contracted to collect waste from publicly owned health facilities along the south and east coasts of the province.

9. Ozone Depleting Substances

New Brunswick instituted a comprehensive regulation in September 1992. Over 1000 service technicians have undergone training and are being certified. Inspections of various service centres and manufacturing operations have begun. The regulation closely complements the federal rules and implementation has been relatively uncomplicated to date. Several additional provisions take effect on April 1 and December 31 of this year.

10. Acid Rain

A comprehensive monitoring system continues to show high levels of acid deposition throughout Southwestern New Brunswick. Emissions were up somewhat in the electric utility sector in 1992, but will begin to fall sharply this year as Canada's first scrubbed coal plant at Belledune comes on line over the summer, and will fall again in 1994 as the retrofitted scrubber at Dalhousie plant is commissioned. Smelter, refinery and pulp mill emissions remained stable. New Brunswick anticipates meeting its 1994 SO_2 emission reduction commitment with some margin.

11. Energy

New Brunswick has recently released a study of the potential for energy efficiency and conservation measures to reduce energy demand and thus air emissions. The report finds that economically attractive measures, given a reasonable buy-in by the public and industry, will permit the province to stabilize or reduce CO_2, NO_x and even VOCs. The province is developing an implementation strategy.

12. Control of CFCs

In 1988, the Ontario Ministry of Energy and Environment (MOEE) began development of a program to control ozone-depleting substances. With the amendment of the Environmental Protection Act (EPA) in 1989, the Ministry was able to pass regulations for the control of CFCs and halons. Since then, MOEE has by regulation:

- banned the use of CFCs in aerosols and in the manufacturing of foam packaging;
- required a phase-out of the manufacturing and importation of CFC-blown foams;
- required that automobile refrigerants, as of July 1, 1991, be collected; and
- set up the administrative infrastructure to assist in the recycling and reclamation of stationary refrigerants.

13. Ground Level Ozone in Ontario

In November 1990, the Canadian Council of Ministers of the Environment tabled Phase I of a three phase plan to control ground level ozone by controlling the precursor gases NO_x and VOCs. Since that time Ontario has implemented a reduction in the volatility of gasoline, and is examining the possibility of reformulating gasoline to accommodate the reduction in VOCs considering reactivity and toxicity. More stringent tallpipe emission standards for automobiles have been set to reduce NO_x and VOCs. Ontario Hydro, the provinces electrical utility, has promised a 40% NO_x reduction by the year 2000 and is studying cost effective methods of attaining further reductions. Numerous other initiatives are under consideration at this time, including an automobile inspection and maintenance program. Industry have voluntarily started some initiatives and the province is considering what regulatory instruments if any, are required.