

TOXIC AND OXIDANT AIR POLLUTION:

The need for Canadian and American law reform
to solve a shared problem

A Proposal to the Donner Canadian Foundation

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in conjunction with

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Purpose of the Project

Toxic and oxidant air pollution in North America are serious, pressing, and, to date, largely overlooked, environmental problems. In Canada and the United States the impact of these pollutants includes annual crop losses measured, respectively, in the millions and billions of dollars; a potentially grave threat to biological life in the Great Lakes; a concurrent threat to drinking water in a large number of locations; continued degradation of the natural environment; and, most serious of all, an immediate threat to human health.

Although most North Americans are by now familiar with another, better known form of long-range air pollution - acid rain - few outside the environmental sciences realize that acid rain represents an environmental threat which is perhaps less serious, and certainly is less well documented, than are toxic and oxidant air pollution.

It is essential that the governments of both countries begin as soon as possible to take remedial action. Since it is a problem which refuses to recognize national boundaries, that action will be most effective if taken in a simultaneous and coordinated manner.

The purpose of this project, therefore, is to make the Canadian and American publics aware of the nature and severity of the threats posed by toxic and oxidant air pollution and to provide their governments with recommended legislative and administrative reforms which could provide a first step in their control.

The proposed project will be carried out in two stages. The first will consist of a major study, to be published in book form, which will provide a review, understandable to the layman, of scientific knowledge and ongoing research into the problem, an outline of the legislative and political

framework within which each country must address the problem and a discussion of specific and practical legislative and administrative reforms, formulated after drawing upon the best available expertise in both countries, which can be implemented by both Canadian and American governments at different jurisdictional levels.

By presenting, for the first time in one source, a comprehensive review of all aspects of the problem - scientific, legal and political - this volume will stimulate informed and constructive debate and provide the crucial first step in moving governments toward resolution of the problem.

The second stage will consist of a carefully organized public awareness campaign, carried out by the Foundation and the Institute in their respective countries and using their already established communications networks, and a concurrent program of providing the study findings and recommendations directly to governments in both countries. The latter task will require, first, identification of the precise audience to whom the recommendations must be addressed and, second, the carrying out of a carefully planned strategy, described in more detail below, to present those recommendations in as effective a manner as possible.

To date, the dangers inherent in toxic and oxidant air pollution have been overshadowed by other, more highly visible environmental concerns. The purpose of this project is to focus attention on a problem which cannot be solved by either country acting alone but which North Americans can no longer afford to ignore.

Statement of the Problem

(a) The Science

(i) Toxic Air Pollution

Toxic air pollution (also termed "hazardous air pollution" and "toxic fallout") refers to the problem of small particles - either metals such as lead, mercury or zinc or organic compounds such as PCBs or DDT-group pesticides - which, even in minute amounts, represent a threat to the health of humans and other organisms.

These substances are routinely emitted during such activities as industrial manufacturing, chemical processing and municipal incineration, and may then be carried hundreds of miles from their source before being deposited on land or water.

Toxic air pollution presents a number of threats. It represents a danger to drinking water supplies in large areas of North America. Of prime concern is the effect which atmospheric deposition of toxics in various forms is having upon the Great Lakes, which are particularly vulnerable to the consequences of this form of long-range air pollution. Ms. Lee Botts, Director, Great Lakes Project, Northwestern University, writing in 1982 made the following statement:

The toxic substances in rain and snow and attached to dry dust floating through the air are more of a problem for the Great Lakes than acid rain. Scientists generally agree that today contamination by toxic fallout is the greatest threat to the long-term health of life in the Great Lakes system. Atmospheric deposition is the major cause of toxic contamination of the upper Great Lakes, and a significant source for the lower lakes. The Clean Air Act does not presently address this problem.¹

While the size of the Great Lakes system and its alkaline character provides protection against acid rain, that same size, because of the surface area exposed, actually increases vulnerability to toxic atmospheric

deposition. This is a particular concern because of the way in which the food chain within the Great Lakes provides an opportunity for the build-up of toxic compounds in fish species often consumed by man.

There is no doubt that atmospheric transport contributes significantly to toxic contamination in the Great Lakes:

Some of the highest levels of PCBs ever measured in fish were found in an interior lake on Isle Royale in northern Lake Superior, hundreds of miles away from any possible direct source.²

The proportion of total toxic contamination in Lake Michigan which has been caused by airborne transport has been estimated at between 60 and 90 percent.³

Studies done by the International Joint Commission echo this concern. The Toxic Substances Committee of the Great Lakes Water Quality Board recently reported that:

The Clean Air Acts of the United States and Canada, which contain comparable provisions for controlling toxic air contaminants, have potential for regulating those contaminants posing significant dangers to human health and to the environment. . . . The level of control that has been achieved for several toxic air pollutants as a result of regulations has been effective. Overall, however, the control of toxic air pollutants has achieved very limited coverage relative to the known lists of airborne toxic substances (emphasis added).⁴

The Committee went on to recommend that:

The Parties to the Agreement, pursuant to Article VI, Section 1(1), should jointly develop a coordinated control strategy for the atmospheric deposition of toxic pollutants. . . . In addition, the Parties, pursuant to Article XI, should evaluate whether or not legislative changes are needed to adequately address the complex problem of atmospheric pollutant deposition to the Great Lakes.⁵

At this time, the human health threat represented by toxic air pollution cannot be stated in exact terms. Laboratory evidence of serious health effects in primates and Japanese experience with accidental exposures have alerted us to the fact that a serious danger exists but we still do not know its true nature.⁶

The one thing we do know, however, is that it will not disappear of its own accord - that will only happen if we heed and act upon the warnings we have been given.

(ii) Oxidant Air Pollution

Oxidants are widely regarded as one of the most serious air pollution problems in North America. They have been shown to cause serious damage to agricultural crops and to other vegetation, in particular, forests, and pose a documented threat to human health in many of the continent's most populated areas.

Atmospheric oxidants consist of ozone, PAN (peroxyacetyl nitrate) and nitrogen oxides, of which ozone is the most important, accounting for more than 90 percent of the total oxidizing capacity. Unlike other pollutants, they are not directly emitted but instead are produced in the atmosphere by sunlight acting on such pollutants as nitrogen oxides and reactive hydrocarbons. Sources of these precursors include utility combustion, industrial emissions and vehicle exhausts. Control of the problem is thus dependent upon effective control of these chemical precursors.

The threat to vegetation is very real. "Photochemical oxidants are the most damaging air pollutants currently affecting agriculture and forestry in the United States."⁷ It has been estimated that ozone is responsible for 90 percent of the total crop damage caused by air pollution.⁸

In the United States, the economic costs of this damage has been estimated, using data assembled by the National Crop Loss Assessment Network, at somewhere in the neighbourhood of 3 billion dollars a year.⁹ The comparable figure for southern Ontario alone is between 15 and 20 million dollars (Dr. Sam Linzon, Ontario Ministry of the Environment, verbal communication,

December 30, 1982).

Although difficult to quantify, the deleterious effect of oxidants upon forests in North America has been solidly established beyond any possibility of doubt. Numerous field studies have related significant changes in forest ecosystem response to ambient oxidant concentrations.¹⁰ Laboratory studies have shown that conifers such as spruce, fir and pine are particularly vulnerable. The problem is extremely pervasive. In 1980, Dr. Wayne Williams of the Institute of Ecology sought to undertake a study of the impacts of oxidant air pollution on sequoia trees, North America's largest and oldest conifers. Dr. Williams was alarmed to discover that he could not undertake the planned research because he could find no unimpacted trees that had not been subject to substantial concentrations of oxidants, against which to compare trees suffering air pollution damage (verbal communication, Williams to Wetstone, March 1980).

Most alarming, however, are the effects of ozone upon human health. Effects of exposure include irritation and constriction of bronchial and respiratory systems, chest tightness, coughing and wheezing. Those suffering from chronic respiratory ailments such as asthma are particularly vulnerable. High levels of exposure can reportedly trigger heart attacks.¹¹

Not surprisingly, since it is a principle component of smog, ozone concentrations are highest in urban areas. Acceptable levels of ozone established by the U.S. Clean Air Act are still a subject of debate in that country, with many claiming that they do not provide sufficient health protection. The fact remains, however, that in 1977, over 140 million people - over half of the population of the United States - lived in urban areas containing higher concentrations of ozone than was allowed in the Act.¹²

Taken together or singly, these three factors - the dollar cost,

damage done to the environment and the public health threat - indicate clearly that oxidant air pollution is a problem which must be combatted much more seriously than it has to date. Unfortunately, as past experience has indicated, an effective solution will not come easily.

(b) The Law

The increasing attention paid to environmental damage caused by acid rain has, over the past few years, drawn the attention of the general public and government decision-makers to shortcomings in both Canadian and American clean air legislation, particularly with regard to long-range, transboundary pollution. To date, however, that attention has not been extended to other, less well known forms of air pollution. Yet many experts believe that toxic and oxidant air pollution represent a more serious, more immediate and more scientifically certain environmental danger than does acid rain.

The following two sections describe shortcomings inherent in both Canadian and American law which must be rectified if the problem of toxic and oxidant air pollution is to be eliminated or even significantly reduced.

(i) Canada

Canadian legislation relevant to the control of transboundary air pollution from toxics and oxidants is split, jurisdictionally, between the federal and provincial governments. Federal and provincial powers to enact legislation with respect to the problem of air pollution are both very broad. This situation provides an opportunity for comprehensive cooperative arrangements between governments but can also lead to important gaps. The federal government takes the approach that, with the exception of certain works and undertakings subject to exclusive federal regulatory jurisdiction, the provinces have the primary jurisdiction to regulate emissions and discharges into the environment. There is a need to consider ways in which the federal government could take a more direct and active role, within the present limits of its constitutional jurisdiction, to implement solutions in the area of toxic and oxidant air pollution.

The main legislation of relevance at the federal level in Canada is the Clean Air Act (S.C. 1970-71-72, c. 47). This Act gives the federal government the authority to establish National Air Quality Objectives, National Emission Guidelines, National Emission Standards and Specific Emission Standards, all in relation to "air contaminants" which are "emitted" into the ambient air.

In fact, the Canadian federal government has not yet developed any standards, objectives or guidelines for ozone or other oxidants under the Clean Air Act. The Air Pollution Control Directorate of Environment Canada recognizes that oxidants are an important contributor to transboundary pollution, and discussions have been carried on between Environment Canada and provincial agencies such as the Ontario Ministry of the Environment as to the need to develop standards. However, to date these discussions have not proceeded to the point of the development of such standards.

With respect to toxics, the Canadian federal government has tended to identify and take action on the same contaminants as has the U.S. EPA under its Clean Air Act. The Canadian Clean Air Act does not explicitly distinguish between toxics and other contaminants nor does it create a special approach to toxics as does the U.S. Act in its section 112. However, the Canadian Act implicitly restricts itself to the making of binding standards only in respect to toxics by the nature of the authority granted in section 7, which is limited to cases in which human health will be impaired or an international agreement will be breached. Since toxicity is primarily a function of the ability of a substance to impair human health, the Canadian government has tended to focus on substances such as asbestos, cadmium, mercury and beryllium in utilizing section 7.

The approach has been to prepare an inventory of substances

i.e. where this would violate an international agreement. Since there is as yet no agreement between the United States and Canada regulating trans-boundary pollution, the federal government has no authority to make standards strict enough to take such welfare matters into account. It is imperative that any negotiated agreement be broad enough to cover these pollutants and thereby give the federal government the authority it needs. "Welfare" considerations, therefore, are at present regulated by the provinces or not at all.

In any event, there are numerous limitations which affect the ability of these concepts to adequately deal with Canadian sources of toxic and oxidant air pollutants. National Air Quality Objectives are only suggested limits for levels of certain pollutants in the ambient air. Whether they are established or not is at the complete discretion of the Minister of the Environment and even if established are not a legally enforceable limitation on air pollution sources. In addition, they can only be formulated for "air contaminants" which are "emitted" into the ambient air. Certain toxics and most oxidants are not actually "emitted" from the source - they are the products of other pollutants which are emitted and which are then transformed by chemical reaction in the atmosphere during their transport prior to deposition. It is questionable whether the definitions in the Act are broad enough to include such mechanisms and this is an area in which the proposed study is likely to recommend reform.

National Emission Guidelines are limits beyond which certain prescribed air contaminants should not be emitted into the ambient air from pollution sources. Again, the formulation of such guidelines for any particular air contaminant is completely within the discretion of the Minister of the Environment and has no legal enforceability even if formulated unless

considered to be dangerous, identifying the amounts being emitted, the sources of emissions and the locations of emissions. This is followed by a socio-economic impact analysis (SEIA) indicating the costs and benefits of imposing limitations on emissions. An opportunity is provided, except in the case of the need to take emergency measures, for public comment before any standards are made final. Thus, like the U.S., economics plays a role in setting emission levels.

Standards have been promulgated for mercury emissions from chlor-alkali plants, asbestos from mining and mining facilities, lead from secondary lead smelters, and vinyl chloride emissions. Emission inventories have been done for cadmium and beryllium, indicating that the main sources of cadmium in the air are primary copper and nickel production and industrial and commercial fuel production and that beryllium emissions come mainly from coal combustion and from coke combustion (mainly in iron foundries).

Whether these limits on toxics are adequate to control long-range, long-term build-up is doubtful, total loadings and accumulation over time in the environment being a more important factor in long-range pollution than concentrations in the ambient air at any particular time.

The federal regulations have been subject to the criticism that they do not place any limit on the total amount of material an operation may emit into the air. They are expressed as units of material per unit of air. By operating longer hours or expanding production, an operation can emit more material and still meet the existing legal standards.

Under section 7 of the Clean Air Act, the federal government can move beyond health effects to what are known under the U.S. Clean Air Act as "welfare" considerations (e.g. visibility impairment, crop damage, fish kills, vegetation damage, human discomfort) only under specific circumstances,

adopted and incorporated into legislation by another regulatory agency (such as a provincial government). Few guidelines have actually been published - none of any real significance for the problem of toxics and oxidants. National Emission Standards, once formulated, are legally enforceable. However, as above, the formulation of appropriate standards is completely discretionary. (Unlike the U.S. Clean Air Act which in numerous instances imposes mandatory duties on the Administrator of the Environmental Protection Agency, the Canadian legislation rarely if ever goes beyond authorizing discretionary action by the Minister.) Again, the "air contaminant" that is "emitted" would constitute a "significant danger" to the health of persons or be likely to violate the terms of an international agreement. In the absence of such an international agreement the Act sets a very high standard of proof and harm that must be established before standards can be formulated. The proposed study will recommend reform in this area. Specific Emission Standards can only be applied to federal undertakings under the Act, and only if a national air quality objective has already been formulated for that contaminant. This, together with similar limitations as above, combine to make the potential degree of control of the problem by these standards insignificant.

These and other sections of the Clean Air Act and other federal legislation have some significant potential for obtaining a degree of control over the problem of toxic and oxidant air pollutants. Definitional problems and other limitations such as those outlined above combine to seriously weaken this potential. Amendments are needed which can strengthen the ability of this legislation, within the jurisdictional limits of the federal power, to deal with this problem. Amendments must take into account the manner in which toxic and oxidant pollution arises and how it is transported

and transformed between source and damage to ensure that proposed amendments will provide for effective control.

Provincial law in Canada also provides opportunities for control of this air pollution problem. For example, in Ontario, the Environmental Protection Act (R.S.O. 1980, c. 141, as amended) provides a mechanism for controlling air pollution according to either quantified standards as prescribed by regulation or according to qualitative criteria set out both in the Act and by regulation.

While the Act gives the Minister of the Environment wide-ranging regulation-making authority, including the authority to regulate emissions of contaminants, this is a discretionary power and the only quantitative regulations that have been made restrict only the concentrations allowable at defined points of impingement in the immediate vicinity of the source. Generally speaking, the total quantity of a pollutant emitted is not restricted so long as local concentrations do not exceed these limits. Tall stacks can ensure that local levels are low while long distance transport of toxics and oxidants is allowed to continue, and even encouraged, to accomplish the close-range goals.

Ontario Regulation 308 under the Environmental Protection Act sets concentrations for various contaminants which cannot be exceeded at any point of impingement. Standards are included for oxidants such as ozone (200 micrograms per cubic metre of air), nitric acid (100 micrograms per cubic metre of air) and others and for a number of toxic air contaminants including cadmium (5 micrograms per cubic metre of air), mercury (5 micrograms per cubic metre of air), beryllium (.03 micrograms per cubic metre of air) and others (but not including asbestos or vinyl chloride which are both restricted by standards for hazardous air pollutants under section 112

of the U.S. Clean Air Act).

Other provinces in Canada generally do not have air pollution regulations even as comprehensive as Ontario's, therefore the absence of enforceable federal standards results in uneven regulation of ambient standards in Canada.

Even where ambient standards of this type do exist and are enforced, these standards were not formulated with the problem of long-range, long-term build-up of these substances in mind. This problem is more closely related to the total loading of these contaminants over time rather than to the particular concentration at a location at any point in time.

Other sections of the Environmental Protection Act provide that new sources of air contaminants obtain a certificate of approval before commencing operation. No explicit criteria are set out by which an application for such a certificate should be judged and whether or not one should issue is essentially left to the discretion of the Director who administers that part of the Act. This is a closed process between the applicant and the Ministry of the Environment without any public notice or public hearing requirements. Given that the thrust of most of the Act is the control of local levels of pollution, it is unlikely that serious consideration is given to the consequences of long distance transport of toxics and oxidants when such applications are being considered. There are a number of substantive and procedural amendments that are necessary in order to ensure that legislation of this type is effective in controlling such a problem. For instance, reforms may be suggested which would have the effect of requiring that consideration be given to long-range effects of emissions and build-up over time, neither of which are presently taken into account.

Other Ontario legislation and selected legislation in other provinces

will be examined for its potential problems and proposals will be made to improve the effectiveness of such legislation in controlling toxic and oxidant air pollution.

In addition, major proposals for reform intended to reduce acid precipitation will be examined in light of their applicability to the problem of toxic and oxidant air pollution. These will include such things as the objective stated by Mr. John Roberts, federal Minister of the Environment, to reduce all sulphur dioxide emissions in eastern Canada by 50 percent by 1990, subject to parallel action by the United States. In addition, a review of academic and government research papers will be made with the same objective of assessing the value of the recommendations made, and the ways in which those recommendations should be broadened, to cope with the problem of toxic and oxidant air pollution.

(ii) United States

The key piece of legislation relevant to control of oxidant pollution in the U.S. is the Clean Air Act (42 U.S.C. ss. 7401-7642). The cornerstones of the Clean Air Act are the National Ambient Air Quality Standards (NAAQS), which establish concentration levels that must not be exceeded if pollution levels are not to endanger the public health or welfare. While the NAAQS are set at the national level, the attainment and maintenance of the standards for each criteria pollutant are primarily the responsibility of each state. Each state must develop comprehensive State Implementation Plans (SIPs) which must meet Environmental Protection Agency approval. The SIP must set out the state's control requirements for emissions of criteria pollutants from stationary sources within the state so that the NAAQS will be achieved by specific deadlines. NAAQS have been established to date for seven criteria pollutants: sulphur dioxide, carbon monoxide, total suspended particulates, ozone, hydrocarbons, nitrogen dioxide and lead.

Oxidant Pollution

The ambient standard for ozone is the Clean Air Act requirement most directly relevant to the oxidant pollution problem. Ozone is by far the most predominant oxidant pollutant, comprising roughly 90 percent of oxidants in the atmosphere. The chemical designation of the standard was changed from photochemical oxidants to ozone in 1978. The switch was reportedly intended to promote consistency, since the monitoring and health effects studies underlying the standard measure only ozone. But the standard now ignores some oxidants with potentially serious health and environmental effects such as peroxyacetylnitrates (PAN), nitric acid and peroxides. There is no indication that EPA will pursue separate standards for these pollutants.¹³

EPA also adopted new, less stringent photochemical oxidant standards. The original primary (health protection) and secondary (environmental

protection) standards of 0.08 ppm set in April 1974¹⁴ were relaxed by fully 50 percent to 0.12 ppm.¹⁵ EPA based the relaxation on a re-evaluation of earlier data and on new information indicating that the "margin of safety" for asthma attacks was higher than originally presumed. At the time of the 1971 standard, EPA believed that the ozone exposure level causing adverse health effects to asthmatics was 0.10 ppm, considerably lower than the 0.25 ppm level the Agency now accepts.¹⁶

A central problem with the original standard, although one that EPA was not free to openly consider in its revision, is that it was beyond the reach of most urban areas. Only Spokane and Honolulu, among cities with a population of greater than 200,000, met the original 0.08 ppm standard.¹⁷

Even with the revised standard, attainment is still a problem. Ozone levels exceed the national ambient air quality standards by proportionally greater amounts than do the levels of any other pollutant. The U.S. National Commission on Air Quality (NCAQ) identified 21 major metropolitan areas that had ozone levels of at least 0.18 parts per million, or 50 percent higher than the standard in 1979.¹⁸

While the precise figures are not yet available, it is expected that nearly 50 urban areas will be found to have exceeded the ozone standard in violation of the Act's 1982 year-end deadline. Some of these areas may be subject to federal sanctions including possible cut-offs of federal funds, and prohibitions on new source construction. In most cases an extension until 1987 will be granted. But the NCAQ projected in 1981 that seven areas, containing nearly 35 million people, will still exceed the ozone standard in that year.¹⁹

Even where it is attained, the current ozone standard is not sufficiently stringent to prevent damages to crops and forests. The vast areas

subjected to high ozone levels can suffer a variety of vegetative damages at concentrations of as low as half of the 0.12 ppm standard level. A 1980 EPA study listed the plant effects at low concentrations.

Ozone at concentrations of 0.05 to 0.08 has been shown to cause effects including decreased photosynthetic rate and carbohydrate formation, membrane disruptions, enzyme coagulation, osmotic dislocations, lowered ATP production, premature leaf senescence, disruption of citric acid cycle, disruption of organelles, and inhibition of the partitioning of solutes to roots, shoots and fruits. Yield losses of crops occur at O₃ concentrations that do not cause visible injury in the species affected. 20

In part, the problem is that the Clean Air Act is poorly suited to the prevention of environmental impacts, such as damages to crops and forests, through the ambient standard approach. The Clean Air Act draws a major distinction between pollution-related health problems and the impacts of all other sorts, collectively termed "welfare." The air pollution regulatory programs established by EPA to achieve the Act's ambient air quality standards have focussed almost exclusively on the health side of the picture. Welfare effects have been largely overlooked. In part, this is because a higher priority is, naturally, attached to the protection of health. However, the emphasis on health is also partly attributable to the failure of the EPA to develop a workable approach for establishing standards to protect against the broad range of diffuse and often unquantifiable welfare impacts.

Congress offered the Environmental Protection Agency little guidance regarding the establishment of welfare or "secondary" ambient air quality standards. The Clean Air Act simply instructs EPA to set the standard at the level "requisite to protect the public welfare from any known or anticipated adverse effects" (emphasis added). "Welfare" includes nearly every conceivable natural and material good: encompassing effects on forests, soils, lakes, wildlife, visibility, climate, man-made materials, and personal comfort among others. If taken literally the prohibition against "any"

adverse welfare impacts would, for some pollutants, mandate establishment of impracticable near-zero pollution standards. The Agency is left to its own to determine what sort of trade-offs, if any, are appropriate in defining the permissible level of impact. Nor does the Act offer EPA guidance in prioritizing among the various types of welfare concerns.

No effort has been made to systematically account for and respond to this array of pollution effects. Although the EPA could attempt to address in a methodical fashion the key issues left unresolved by Congress, it has chosen not to promulgate regulations setting out its own guidelines. In most cases the Agency has been content to implement the welfare provisions simply by making a determination that for a given pollutant standards established to protect health would serve to adequately protect welfare values as well.

For five of the seven "criteria pollutants" governed by national ambient air quality standards, including ozone, the welfare or "secondary" standards were somewhat arbitrarily established at levels identical to the corresponding "primary" or health-based standard. In the case of particulates, the Agency latched onto the single solid quantitative figure available, and set the secondary standard at the level determined to correspond to visibility values acceptable for safe aircraft landings.

Toxic Air Pollutants

Toxic pollutants are controlled by a specific provision of the Clean Air Act, Section 112²¹ which subjects particularly dangerous air pollutants to more rigorous regulatory requirements than conventional pollutants controlled pursuant to ambient air quality standards. Section 112 was designed to permit stringent, uniform and relatively quick federal regulation of substances that pose risks of serious illness at relatively low concentrations.

The establishment of National Emission Standards for Hazardous Air Pollutants (NESHAPS) was intended to prevent environmental poisons. However, there has been little regulatory activity under that provision, in part because the EPA could not come to grips with the draconian measures that section 112 mandates for affected pollutants.

The Statutory Framework. The Clean Air Act defines a hazardous air pollutant as a substance emitted by a stationary source²² which, in the judgment of the Environmental Protection Agency (EPA) Administrator, "causes, or contributes to, air pollution which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness."²³ Once a substance is designated a hazardous air pollutant under Section 112, EPA must comply with a demanding timetable. The Agency must propose an emission limit within 180 days²⁴ and promulgate a final standard within 180 additional days unless the Administrator "finds, on the basis of information presented at . . . hearings, that such pollutant is clearly not . . . hazardous."²⁵ The standard becomes effective for new plants immediately and for existing plants 90 days later.²⁶

The statute directs the Agency to set highly protective standards that eliminate serious health risks. EPA must set the standard at the level that in the Administrator's judgment "provides an ample margin of safety to protect the public health . . ."²⁷ The statute does not direct EPA to consider control costs in choosing the requirements that provide an "ample" safety margin. The legislative history of the 1970 Act suggests that the absence of such language is purposeful, reflecting congressional intent that EPA should consider only health-related information.²⁸ In addition, Section 112 establishes a relatively low standard of proof that a substance is harmful. The evidence need only show possible causation or contribution to serious

health effects.²⁹

A literal reading of the statute leads to the conclusion that for some substances EPA must set standards that completely eliminate emissions in order to assure an "ample margin of safety." This might be true for substances for which "threshold" doses - levels below which adverse effects do not occur - cannot be identified. Carcinogens are the most important examples. Since no safe level of exposure to such substances can be identified, the achievement of a "margin of safety" for public health may require eliminating entirely human exposure.

The strongly protective policy of Section 112 has raised substantial controversy. On the one hand, it represents the view that lives and serious illnesses should not be sacrificed for economic considerations. Yet implementing the statute as written could impose severe economic burdens on various industries on the basis of very limited data. It can be argued that Congress misjudged how often the closing of a single plant or a whole industry would be required by strict application of the section. The 1970 Senate Report stated, "On the basis of information presented to the Committee, it is clear that (the definition of a hazardous air pollutant) will encompass a limited number of pollutants." The report specifically mentions only four substances: asbestos, cadmium, mercury and beryllium.³⁰ However, it now appears that dozens, and maybe hundreds, of substances may fit the hazardous pollutant definition.³¹ Thus, Congress may have been willing to tolerate a few plant or industry closings but not a massive number of closings.

Reflecting these concerns, EPA has never been comfortable with the apparent Section 112 policies of minimizing the risk of death or serious illness regardless of cost and has, as a result, allowed continued release of pollutants poisonous to humans and the environment. Despite the fact that

more than 43 hazardous air pollutants have been officially identified as likely to contribute to health problems and ecological damages in the United States, EPA has issued only four hazardous air pollutant standards to date - for asbestos, beryllium, mercury and vinyl chloride. In addition, benzene,³² radioactive emissions,³³ and arsenic³⁴ have been added to the hazardous pollutant list, although standards for these substances have not yet been promulgated.

The amendment of Section 112 to accelerate the regulation of hazardous air pollution has been recommended by a number of entities including the U.S. National Commission on Air Quality,³⁵ Air Pollution Control Association,³⁶ the Clean Air Coalition,³⁷ and the Association of Local Air Pollution Control Officials.³⁸ Some have suggested that Congress authorize the use of risk/benefit analysis in standard setting to reduce the potentially sweeping economic impacts of Section 112. Others have advocated the use of technology-based standards and the establishment of new, more meaningful statutory deadlines to prompt EPA action in the identification and control of toxic pollutants.

The Clean Air Act principles announced by EPA Administrator Anne M. Gorsuch on August 5, 1981 identified control of hazardous air pollution as one of the few areas in which the Reagan Administration favours increased EPA activity.³⁹ But early Administration drafts of legislative language would significantly narrow the coverage of Section 112, and would replace the current standard setting directive with a discretionary mandate to utilize a cost-qualified technological standard.⁴⁰

The Proposed Project

There are no easy solutions to the shortcomings in the two national clean air structures which have been outlined above. But there are opportunities for substantial improvement.

The proposed study will examine in detail the nature and severity of the two problems and consider the most viable options for control available within the context of the Canadian and U.S. regulatory frameworks. Regarding the Canadian system, the project will examine numerous options including: possible changes in the division of federal and provincial authority; proposals for new pollution control programs and their constitutional basis; definitional changes in the Clean Air Act; new emission guidelines governing toxic pollutants; and means to deal more effectively with long-range transport of pollution. In the U.S., the project will evaluate possible changes including: revisions to the Clean Air Act ambient standard for ozone; new motor vehicle control requirements; refinements in the State Implementation Plan structure to improve administration of pollution control requirements; and means to expand the coverage of hazardous air pollution standards.

In terms of possible cooperative measures to be taken by both countries, the project will examine the history and current state of acid rain negotiation to evaluate possibilities for expanding their effective coverage to include these other forms of transboundary air pollution. The project will evaluate other available models and research into methods of cooperation between nations in solving such problems, including, for example, a study published recently by Environmental Mediation International, Inc. on the use of Section 115 of the U.S. Clean Air Act to control transboundary pollution, or a study currently being conducted by the Environmental Law Institute and funded by the American Donner Foundation, of the practical feasibility of

providing a significant legislative role for an independent, bilateral scientific committee in controlling transboundary air pollution.

In examining these options, the project team will consider the inevitable trade-offs between economic and environmental considerations which are an integral part of environmental policy-making in both countries. Recommendations advanced will be incremental, realistic and such that can be implemented by both countries in the near term.

During the course of the research study the project team will draw upon the expertise, and attempt to enlist the support, of those people in both countries who are best positioned to take effective action. At the conclusion of the research study the project will by no means be over. The next, and perhaps most important state, will then begin. That will consist of raising public awareness of the problem and, at the same time, presenting the study recommendations to a very closely targeted audience.

The intent of the project is to produce two products, one tangible and one intangible, each of which is equally important. The tangible product is a publication which shall offer for the first time a readable, comprehensive discussion of the complex scientific picture of toxic and oxidant air pollution and the equally complex legislative structures which must be modified and amended to control it. The intangible product is a stimulus to public debate and a suggestion to governments of the first steps which might be taken down the path which, sooner or later, they must inevitably follow.

The problems of toxic and oxidant air pollution are extremely serious and complex. They represent domestic environmental problems which both countries must begin to address as quickly as possible. More than that - because toxic air pollution poses a critical threat to the greatest shared U.S.-Canada resources, the Great Lakes, and because oxidant air pollution is a transboundary problem for both countries - they should, ideally, be grappled with jointly and in cooperation.

That is why this project proposal is presented jointly by two environmental law organizations, one Canadian and one American, and why it is structured in terms of parallel action resulting in simultaneous presentations being made to the Canadian and American governments.

Workplan

It is expected that the project will take approximately 18 months to complete. Approximately two-thirds of that time will be devoted to carrying out the research study and arranging for its publication. The remaining third will be devoted to presenting the study findings to the general public and governments in both countries.

The project will be carried out with the assistance of an advisory committee made up of approximately six people, representing a mix of Canadians and Americans. Three areas of expertise will be represented on the advisory committee - science, law and public policy.

The various topics examined during the course of the study will be researched by means of computerized literature searches (supplemented by in-house documents) and interviews with key individuals. The extensive interviews anticipated for this project will help ensure that the analysis is thorough and accurate.

A description of each step in the workplan and the method of project management follows.

(a) Stage I - Research Study

1. Advisory Committee

The first step will consist of creation of an advisory committee which will provide the benefit of its experience and expertise during the course of the research study and to lend credibility to the research findings during the presentation to governments.

Examples of the types of people with whom the Foundation and Institute have had contact and who might be approached to serve on such a committee include:

Dr. Hans Martin, Atmospheric Environment Services, Environment Canada
Mr. Neil Mulvaney, Q.C., Director, Legal Services Branch, Ontario
Ministry of the Environment
Professor Kenneth Hare, Provost, Trinity College and an Honourary
Director of the Canadian Environmental Law Research Foundation
Mr. Robert Sugarman, former Chairman, International Joint Commission
Mr. Ellis Cowling, Director, National Atmospheric Deposition Program,
Washington
Mr. George Rejon, Environmental Counsel, Canadian Embassy, Washington

Formation of the advisory committee will be the first step in the project.

2. Scientific Review

By means of literature searches and interviews in both countries a review of the present status of scientific research on the formation, transport and environmental impact of toxic and oxidant air pollutants will be carried out. A summary of this review, as well as specific case studies, will then be prepared and included in the final publication.

Scientific research will continue to be monitored after completion of the study, during the presentation stage, in order that the presentation to government may be updated as required.

3. Existing Legislation

Existing legislation and administrative mechanisms in both countries will be reviewed and a comprehensive summary prepared. A thorough presentation of the relevant legal and administrative frameworks for controlling toxic and oxidant air pollution will provide a solid platform for the debate which this publication is intended to stimulate. More importantly, however, this review will identify the deficiencies which the study will then go on to address.

4. Current proposals for reform

To date, long-range air pollution has been considered most intensively within the context of acid precipitation. Various proposals for legislative reform, intended to cope with that particular problem, have been advanced. It is most likely that the problem of toxic and oxidant air pollution can be successfully addressed by ensuring that legislation governing acid precipitation, when it is eventually enacted, will be sufficiently broad to provide for control of this equally serious problem.

For that reason, a summary will be provided of the history of negotiations between the two countries pursuant to the August, 1980, Memorandum of Intent. An analysis will then be made of the applicability of the various acid rain control proposals to other forms of air pollution.

Again, the most important part of this exercise will be identification of the deficiencies in these proposals which must be rectified to ensure that all aspects of the long-range problem may be controlled.

5. Draft proposals for reform

Based upon the foregoing, and after extensive interviews with air pollution control experts in both countries, and with the advice and assistance of the advisory committee, draft proposals for legislative and administrative reform will be formulated. The emphasis here will be upon advancing proposals which are both effective and politically viable.

6. Test the proposals

These draft proposals will then become the subject of detailed discussion at two, one-day seminars, one to be held in each country. The seminars will be arranged on an invitation-only basis and, to allow full discussion, attendance at each will be limited to a maximum of twenty. The press will not be invited. Representation will be from the civil service, academe and concerned public interest groups.

The purpose of the seminars will be two-fold. They will provide informed comment which will be used in refining and improving the draft proposals and, just as important, by involving them at this stage, making the relevant bureaucracies of each country more receptive to the study's ultimate findings.

7. Draft the report

The final step in Stage I will be drafting the final report. The report will provide concrete and graphic illustrations of the problem, using case studies to lucidly summarize the current state of scientific knowledge of the formation and transport of these pollutants, as well as the means available for their control, and will present the study's findings regarding the most effective approaches for legislative and administrative reform.

The book will be written in such a way as to be intelligible to an informed, but non-specialist, audience.

Stage II - Presentation to Public and Governments

1. Publication

Arrangements for publication in Canada and the United States will be made at the beginning of the research study, drawing upon the good working relationships which the Foundation and Institute have established with a number of publishing houses. Since the book will have only a limited market and is unlikely to generate sales sufficient to cover publishing costs, funds for this purpose have been included in the budget.

2. Public Awareness

A summary of the book's major findings and recommendations will be prepared and distributed to environmental organizations in Canada and the United States with the request that it be brought to the attention of their membership. The same summary will be brought to the attention of the news media in both countries. Both the Foundation and Institute will work actively to supplement the marketing campaign of the book's publisher.

3. Identify Government Audience

The study recommendations will be directed primarily toward a relatively small group of elected and non-elected government officials at both the federal and provincial or state levels in Canada and the United States. Given the experience of the Foundation and Institute in working with environmental sections of government, it will be a relatively straightforward task to identify this audience in precise terms. A more intense publicity campaign, tailored for this specific audience, can then be undertaken. As a first step, this will include such things as mailings of the summary referred to above and in addition, in some cases, mailing complimentary

copies of the book as well.

4. Conferences

One conference will be held in each country to present the study findings and recommendations. All interested sectors will be invited to attend, with particular emphasis upon elected officials. It is hoped the conferences will generate a certain amount of media attention.

Funds have been included in the budget for honouraria and travelling expenses of some speakers. It is expected that, aside from this, the conferences will be self-sustaining.

5. Presentation to Governments

Every effort will be made to present the study findings before relevant committee hearings at different government levels in Canada and the United States.

The study findings will be made available to the staff and members of appropriate committees of the United States Senate, House of Representatives and Canadian House of Commons. If possible, the findings will be formally presented at hearings of those committees.

In addition, contact will be made with key elected figures known to have concerns about the study's subject, such as Senator Robert Stafford (R. Vermont), Senator George Mitchell (D. Maine), Representative Henry Waxman (D. California), Senator John Chafee (R. Rhode Island) and, in Canada, the Honourable John Fraser, M.P., Jim Fulton, M.P., and the Honourable John Roberts. As much as possible the services of elected representatives will be enlisted in creating other forums for presentation of the study findings. For instance, Senators Mitchell and Stafford may be

asked to request oversight hearings of the U.S. Senate Environment and Public Works Committee on the specific issue of toxic and oxidant trans-boundary air pollution. Rep. Waxman may be asked to convene similar oversight hearings of his Subcommittee on Environment and Health of the U.S. House of Representatives Committee on Energy and Commerce. Mr. Fulton may be asked to convene a task force similar to the existing N.D.P. Task Force on Toxic Chemicals.

During the course of the study, other avenues for presentation will be explored and mapped.

(b) Project Management

Although the proposed project will be carried out by the Canadian Environmental Law Research Foundation and the Environmental Law Institute working in partnership, for purposes of project management this funding application should be deemed to be submitted by the Foundation alone. If the project is approved, the Foundation alone shall be financially accountable to the Canadian Donner Foundation. The Foundation will then enter into a contractual relationship with the Institute.

It is planned that both the work and available funding shall be shared approximately equally, with the Foundation responsible for those sections pertaining to Canadian law and the Institute responsible for American law. The Foundation will research the problem of toxic air pollution while the Institute will research oxidant pollution. It may transpire, during the course of the project, that the workload is not shared completely equally, in which case corresponding adjustments will be made to the financial arrangements. The Canadian Donner Foundation will be immediately informed of any such changes.

During the course of the project the Canadian Donner Foundation will be supplied with quarterly financial statements.

Mr. Doug Macdonald, Executive Director of the Foundation, will be Project Coordinator. Mr. Gregory Wetstone will be Project Director (U.S.) and Mr. Stephen Garrod will be Project Director (Canada). Both Mr. Wetstone and Mr. Garrod will make arrangements for the necessary research and secretarial assistance. Mr. Wetstone and Mr. Garrod will stay in communication by mail and telephone and will meet as often as required. It is anticipated that this will be approximately once every six weeks. Mr. Macdonald will be in continuous communication with both and will provide

overall administrative coordination of the project.

Curricula Vitae of the three people mentioned above are included as Appendix B.

After completion of the research study the services of an editor will be obtained to oversee preparation of the manuscript for publication.

Staff carrying out the project will draw upon the resources of the Advisory Committee, the Foundation and its sister organization, the Canadian Environmental Law Association, and the Environmental Law Institute.

Budget1. Stage I - Research Study

Salaries

Editor	\$ 2,500
2 Project Directors	45,720
Legal Research assistance	12,000
Research assistance	22,000
Secretarial assistance	11,000
	<u>93,220</u>

Other Costs

Telephone, \$500 per month, 18 months	\$ 9,000
Copying	2,000
Travel	7,500
2 seminars, \$5,000 each	10,000
computer time/word processing	2,500
subscriptions/book buying	2,500
postage/freight	500
supplies	1,000
	<u>35,000</u>

2. Stage II - Presentation

Publication	\$ 5,000
Marketing	5,000
2 conferences, \$5,000 each (remainder of cost self-funding)	10,000
Travel, to Ottawa and Washington, for presentation	10,000
	<u>30,000</u>

3. Administration \$35,000

<u>TOTAL</u>	<u>\$193,220</u>
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All figures are in Canadian dollars.

The Environmental Law Institute

The Environmental Law Institute is a national, nonprofit (501(c)(3)) centre for research in the fields of environmental law and policy. Founded in 1970, the Institute has grown to a multidisciplinary staff of 45, including lawyers, economists, biologists, engineers and political scientists. The Institute has three interrelated divisions - publications, conferences and research. The conference program provides forums for the full range of participants in environmental policy to keep abreast of activities and rapid developments in such areas as air and water pollution, land use and toxic substances. In addition, these conferences offer desperately needed opportunities for interaction and consensus building between the often adversarial parties involved in environmental policy. The mainstay of the publications division is the Environmental Law Reporter, a legal periodical providing news and commentary to a wide and diverse audience. The Environmental Law Reporter is complemented by the Environmental Forum, a monthly magazine that crosscuts between environmental professions and interest groups to provide incisive analysis of current environmental issues. The research division is the largest component of the Institute and employs a professional mix that enables the Institute to understand and analyze the myriad of constraints within which environmental policy is formulated. Although functionally distinct, the divisions are closely integrated to ensure that the best skills of the Institute are brought to bear on any specific project.

The Institute is uniquely qualified to analyze the wide range of issues associated with toxic and oxidant air pollution problems and their trans-boundary characteristics. The Institute is a leading centre for the study of law and policy in the context of the complex array of environmental statutes in the United States, and has specifically studied approaches for

improved control of air pollution under the U.S. Clean Air Act including toxics, oxidants and long-range pollutants. Moreover, ELI has conducted extensive studies on the framework for international environmental cooperation, and the details of the pertinent pollution control legislation in the United States and Canada, as well as many of the world's other industrialized nations.

Several of the most relevant Institute publications and studies are described briefly below:

Semi-Annual Analysis of Developments in U.S. Pollution Law. These major reference works describe in detail the major Air and Water Act pollution control programs, and discuss the implications of recent judicial, regulatory, and scientific developments. Key chapters include: "Administrative Law," "Ambient Air Quality Standards," "Prevention of Significant Deterioration," "Non-attainment," "Mobile Source Pollution," "Hazardous Air Pollution Standards," "Water Quality Standards," "Effluent Regulation," "National Pollutant Discharges Elimination System," "Publicly Owned Treatment Works," "Ocean Pollution," "Emerging Pollution Problems," "Enforcement," and "Regulatory Reform." The most recent volume: Air and Water Pollution Control Law: 1982 (1982, 700 pages).

Institutional Aspects of Transported Pollutants. This study explores the institutional aspects of legislative and regulatory proposals to counter the acid deposition, visibility deterioration, and regional oxidant pollution problems associated with long-range air pollutant transport. It focuses on nine proposals selected by Commission staff from a collection of 35 possible transport control strategies assembled by the Environmental Law Institute. Selected proposals are analyzed with respect to the administrative and political feasibility of each, the time and resources each would require to

reduce emissions of transported pollutants, and the relative environmental and economic impacts.

Long-Range Air Pollution Across National Boundaries: Recourses in Law and Policy. This report describes and assesses the means by which the U.S. or Canada would, if suffering transboundary pollution damage, seek abatement in the pollution exporting nation. Discussed in detail are: international law; domestic air quality legislation in both countries purporting to control transboundary pollution; domestic court actions; diplomatic channels; and the treatment of international environmental impacts in government decision-making. Also treated are existing bilateral obligations, and the drafting of a U.S.-Canada agreement on transboundary air quality.

Acid Rain in Europe and North America: National Responses to an International Problem. Chapters 1 and 2 review the range of scientific issues crucial to acid deposition and its impacts. Chapter 3 discusses the technologies available to industrialized nations to control pollutants causing acid rain. Chapters 4, 5 and 6 survey the laws and policies relevant to the production and control of acid pollution in each of the six European and North American nations chosen for detailed study. Chapters 7 and 8 analyze the international laws and institutions available or potentially available to promote coordinated national action to control transboundary acid pollution. The final chapter offers an overall assessment of the current system and some thoughts on means to improve the control of acid rain and similar international pollution problems.

The Theory of Chemical Control. The Institute has published an article on the controversial topic of using cost-benefit analysis in making decisions about toxic chemicals. The article, which appeared in a special report on the hazards of environmental pollution, notes the pitfalls in using this

analytic technique, and suggests ways to improve the control of dangerous chemicals.

Assisting Victims of Chemical Pollution. The Institute has just completed a major work in this area, titled "Statutory Reform of 'Toxic Torts': Relieving Legal, Scientific and Economic Burdens on the Chemical Victim." In this 230-page report, the Institute proposes model legislation for compensating victims of toxic substances pollution.

International Chemical Control. Efforts to promote uniform international chemical control standards promise to improve public health without imposing duplicative or inconsistent requirements on the sale and distribution of useful products in world markets. In a recent article for the Environmental Law Reporter, the Institute discusses the problems in adopting uniform standards, and makes suggestions for "harmonizing" international chemical control strategies.

DDT: Overview of the Recent Scientific and Regulatory History. Conducted at the request of a Washington, D.C. law firm, this 600-page study was completed in less than 10 working days in order to meet the firm's potential litigation deadline. Containing a chronology of the legal, scientific and regulatory history of DDT, the report includes detailed information on state and federal reactions to the DDT controversy.

Federal Toxic Substances Control. This Institute study surveyed and evaluated previous toxic substances regulations and provided recommendations to the Toxic Substances Strategy Committee, established by a White House mandate. The Institute's report, An Analysis of Past Federal Efforts to Control Toxic Substances, was funded by the Council on Environmental Quality.

Toxic Substances and Hazardous Wastes. The Institute completed a 1000-page instructional manual on toxic substances and hazardous wastes. Containing information on legislative, regulatory and judicial developments, the manual was prepared in conjunction with the American Law Institute-American Bar Association as the official manual for their conference on Toxic Substances and Hazardous Wastes.

International Pollution and National Laws: A New Approach (Ongoing. Funded by the American Donner Foundation). This work will explore in detail the practical feasibility of a new approach for control of U.S./Canada transboundary air pollution, identified in a recent ELI study for the U.S. Congress, Office of Technology Assessment. The new mechanism would amend the pollution control laws of both nations to authorize an independent, joint scientific committee to serve as the crucial link in applying general principles of international environmental responsibility to specific transboundary pollution problems.

Environmental Law Institute Staff

The suitability of the Institute to conduct the research and outreach activities described in this proposal is demonstrated not only by its research experience, but also in its multidisciplinary staff and its relationships with environmental professionals throughout the world. Toxic air pollution as well as other international environmental problems is characterized by a complex array of legal, economic, scientific and political factors. The Institute has established over the years a national and international network of environmental lawyers and professionals. This network is formally captured in ELI's associate program with over 350 members from the U.S. and

abroad, and informally through contacts and working relationships with scientists, lawyers and economists from all over the world. The Institute is truly an international convening centre for environmental lawyers with an interest in cooperative problem solving. In the last year alone the Institute played host to environmental representatives from U.S.S.R., Japan, Canada, Israel, Italy and France. This network has a critical role to play in ensuring realistic and functional project recommendations and will be called upon, as necessary, to assist project staff.

Gregory Wetstone, Director of the Institute's Air and Water Program, will direct the proposed project. Mr. Wetstone is a lawyer by training, and has an extensive scientific background. He had prime responsibility for most of the Environmental Law Institute's past research on air pollution problems, and is widely recognized as an expert on the legal and institutional aspects of transboundary pollution problems. He served as an advisor to the U.S. Department of State and the Canadian Parliamentary Subcommittee on Acid Rain on these topics. He is also a member of the National Academy of Sciences' Scientific Committee on Acid Precipitation.

To assist Mr. Wetstone sort through the maze of public policy and scientific issues surrounding toxic and oxidant air pollution control, he will be able to call upon, as necessary, Dr. Devra L. Davis, an authority on toxic pollutants and the scientific basis of environmental regulatory programs, and Roger C. Dower, a public policy analyst with specific expertise in analyzing the costs and benefits of environmental proposals.

Footnotes

1. "Toxic Fallout in the Great Lakes and the Clean Air Act of 1982," Ms. Lee Botts, Director, Great Lakes Project, Centre for Urban Affairs and Policy Research, Northwestern University, 1982, p. 1.
2. Ibid., p. 6.
3. Ibid., p. 5.
4. "Toxic Substances Control Programs in the Great Lakes Basin," a report by the Toxic Substances Committee to the Great Lakes Water Quality Board, no date, p. 18.
5. Ibid., p. 21.
6. Botts, p. 7.
7. "Air Pollution Stress and Energy Policy," F. H. Bormann, published in AMBIO, Vol. 11, No. 4, 1982, p. 191.
8. "The Regional Implications of Transported Air Pollutants: An Assessment of Acidic Deposition and Ozone," Office of Technology Assessment, U.S. Congress, July 1982, p. F-1.
9. Ibid., p. F-2.
10. "The Regional Implications of Transported Air Pollutants," Vol. 11, Appendices, p. FF-92.
11. Air and Water Pollution Control Law: 1982, Environmental Law Institute, 1982, pp. 19-20.
12. "State of the Environment, 1982," The Conservation Foundation, 1982, p. 57.
13. Air and Water Pollution Control Law: 1980, Environmental Law Institute, 1980, p. 7.
14. 36 Reg. 8186 (April 30, 1971).
15. 244 Fed. Reg. 8220 (February 8, 1978).
16. Air and Water Pollution Control Law: 1980, Environmental Law Institute, 1980, p. 8.
17. Ibid.
18. National Commission on Air Quality, To Breathe Clean Air, Washington, D.C., March 1981, p. 3.4-6.

19. Ibid., p. 3.4-27.
20. Orie L. Loucks et al., Crop and Forest Loss Due to Current and Projected Emissions from Coal-Fired Power Plants in the Ohio River Basin, prepared for the Ohio River Basin Energy Study, Washington, D.C.; Environmental Protection Agency, September 1980, p. 6.
21. 42 U.S.C. S7412, ELR Stat. & Reg. 42219.
22. Section 112(a) (2) defines a stationary source with reference to S111(a) (3) as "any building, structure, facility or installation which emits or may emit any air pollutant." 42 U.S.C. S7411(a) (2), ELR Stat. & Reg. 42219.
23. CAA S112(a) (1), 42 U.S.C. S7412(a) (1), ELR Stat. & Reg. 42219.
24. CAA S112(b) (1) (B), 42 U.S.C. S7412(b) (1) (B), ELR Stat. & Reg. 42219.
25. CAA S112(b) (1) (B), 42 U.S.C. S7412(b) (1) (B), ELR Stat. & Reg. 42219.
26. CAA S112(b) (1) (B), 42 U.S.C. S7412(b) (1) (C), ELR Stat. & Reg. 42220.
27. CAA S112(b) (1) (B), 42 U.S.C. S7412(c) (1) (C), ELR Stat. & Reg. 42220.
28. See Union Electric Co. v. EPA, 427 U.S. 246, 6 ELR 20570 (1976).
29. Section 112(a) (1) defines a hazardous air pollutant as one which "may reasonably be anticipated" to cause serious health effects. 42 U.S.C. S7412(a) (1), ELR Stat. & Reg. 42219.
30. S. Rep. No. 1196, 91st Cong., 2nd Sess. at 20 (1970).
31. Doniger, D., "The Growing Threat from Toxic Chemical Air Pollutants," 2 Amicus J 26 (Winter 1981).
32. 42 Fed. Reg. 20332 (1977).
33. 44 Fed. Reg. 76738 (1979).
34. 42 Fed. Reg. 37886 (June 5, 1980).
35. National Commission on Air Quality, Report on the National Commission on Air Quality, to Breathe Clean Air at 2.2-3 (March 1981).
36. "Executive Committee Identifies Issues, Develops Position Statement on Clean Air Act Amendments," 31 J. Air Poll. Control Assn. 796 (July 1981).
37. National Clean Air Coalition, Positions on the Clean Air Act (April 1981), pp. 25-26.
38. Positions on the Clean Air Act by the Associates of Local Air Pollution Control Officials (April 1, 1981).

39. Press release from Environmental Protection Agency Administrator Anne Gorsuch (August 5, 1981).
40. Natural Resources Cabinet Council, Draft Clean Air Act Proposal, released by Congressman Waxman (June 19, 1981). Environmental Protection Agency, Draft Clean Air Amendment (August 20, 1980).

APPENDIX A

DOUGLAS CHARLES MACDONALD

Born: June 23, 1947

Office: 366-9717

Home: 465-1231

100 Bain Ave.
#8 The Lindens
Toronto, Ont.
M4K 1E8

WORK EXPERIENCE

Oct. 1982 - present:

Executive Director
Canadian Environmental Law Research Foundation

Sept. 1980 - Oct. 1982:

Special Assistant to Mayor Lastman
Mayor of the City of North York

Oct. 1978 - Oct. 1980:

Secretary
The Agora Foundation

July 1976 - July 1977:

Executive Assistant to Mayor Lastman

May 1974 - June 1976:

Research Assistant to Mayor Lastman

EDUCATION

M.A., Canadian History, University of Toronto

Completed first year of Phd. program, Canadian History, U. of T.

VOLUNTEER EXPERIENCE

. two terms a member of the Board of Directors of the Bain Apartments Co-operative, a 260 unit housing co-operative

. member of the Bain Co-op Finance Committee: preparation of operating and capital budgets and other aspects of financial management

. member of the Bain Co-op ad hoc committees to draft personnel policy and to plan and implement energy conservation measures

PUBLICATIONS

AGORA, the newsletter of the Agora Foundation: No. 1, Vols. I - IV

"Shutdowns"; Perception Magazine, periodical of the Canadian Council on Social Development, Jan./Feb., 1981

(discussion of the impact of plant closures in Ontario)

"Where Does the Buck Stop?"; Policy Options, periodical of the Institute for Research on Public Policy, Nov./Dec., 1981

(examination of hazardous waste disposal in Ontario)

"Out from Under"; Quest Magazine, November, 1982

(proposal for reforming local government in Metropolitan Toronto)

CURRICULUM VITAE

PERSONAL INFORMATION:

Name: Stephen Russell Garrod

Address: 9 Clark St. East, Guelph, Ontario N1H 1S6.

Telephone: (519) 837-1604 (residence); (519) 856-9040 (business)

Birth Date: April 28, 1952

EDUCATION:

McMaster University (1970-1974): Honours Degree obtained in Urban-Economic
Geography (1974)

Minor areas of concentration: Mathematics,
Chemistry

York University (1974-1978): Osgoode Hall Law School, L.L.B. (May 1978)

Graduate Faculty of Environmental Studies, M.E.S.
(August 1978)

First Graduate of Combined Program of Law/
Environmental Studies

Osgoode Hall (1979-1980): Law Society of Upper Canada Bar Admission Course
Admitted to Ontario Bar as Barrister and Solicitor,
June, 1980

ACADEMIC RECORD:

McMaster University: Course list available upon request
Over-all academic average: 'A'

York University: Fall 1974 - intro to law
- contract law
- criminal law
- property I
- constitutional law

Spring 1975 - intro to law (cont'd)
- tort law
- civil procedure
- property II
- evidence law

Fall 1975 - intro to faculty of environmental studies
- energy, environment & society
- northern development
- environmental impact assessment
- eco-design workshop

Spring 1976 - energy, environment & society (cont'd)
- resource management
- politics of environment
- ecology
- communication & creativity in interdisciplinary teams
- interpersonal politics & social change

Summer 1976 - independent work re: The Ecologist (1c.u.)
- directed readings in Environmental Law (2c.u.)
- comparative study: Great Britain & Canada (2c.u.)

- Fall 1976 - taxation I
 - energy law
 - environmental protection law
 - advanced criminology
 - psychology & the litigation process
- Spring 1977 - criminology
 - native rights
 - public international law
 - legal philosophy
 - law & third world development
- Summer 1977 - field experience: "The practice of environmental law"
supervisor: David Estrin (5c.u.)
- Fall 1977 - tax reform seminar
 - administrative law
 - personal research project
 - individual contract of employment
 - values & perspectives on the nature of planning
- Spring 1978 - tax reform seminar (cont'd)
 - family law
 - land use planning
 - personal income security
 - cultural & historical perspectives on the man/
environment relationship
- Summer 1978 - completion & submission of final synthesis paper:
'Environmental Law'
- Over-all law school academic average: 'B'

Osgoode Hall: Over-all academic average at Bar Admission Course: 75%

ACADEMIC AWARDS:

Ontario Scholarship (1970)

McMaster University Entrance Scholarship (1970)

Dean's Honour List (1974)

EMPLOYMENT EXPERIENCE:

- March 1980 to present: associate lawyer with David Estrin (Eden Mills, Ontario)
- May 1978 - June 1979: articling student to David Estrin (Eden Mills, Ontario)
- Summer 1977: research assistant to David Estrin
- Summer 1974: stockman at Long Manufacturing Ltd., (Oakville, Ontario)
- Summer 1973: assembly line worker, Ford Motor Co. (Oakville, Ontario)
- Summer 1970, 1971, 1972: driver/helper, Javelin Moving & Storage Co.
(Oakville, Ontario)

PROFESSIONAL EXPERIENCE: Practice restricted to Environmental & Municipal Planning Law

In addition to working closely with David Estrin on most of his cases over the past 3 years I have also had individual responsibility for additional cases. Such cases have included: having sole responsibility for organizing, conducting and presenting the opposition of a ratepayers group and a naturalist club before the Ontario Municipal Board in an eight-day hearing to determine the future of a unique parcel of woodland near London, Ontario; and having sole responsibility throughout a three-month Environmental Assessment Board hearing for the carriage of a case presented on behalf of a citizens group in Ajax, Ontario in opposition to a proposal by the Region of Durham and the Ministry of the Environment to convert a redundant sewage treatment plant into a facility for treating liquid industrial wastes.

TEACHING EXPERIENCE:

May-June 1974: Supply Teacher, Blakelock Secondary School, Oakville, Ontario

Fall 1975: Tutorial Assistant, Geography Department, York University

Fall 1978: Assistant, Joint L.L.B./M.E.S. Seminar, Faculty of Environmental Studies, York University

Fall 1978/

Spring 1979: Tutorial Assistant, E.S. 401 - Environmental Law, Man/Environment Department, University of Waterloo

Fall 1978: Instructor, Legal Research Seminar, Man/Environment Department, University of Waterloo

Spring 1979: Adjunct Lecturer, Introduction to Environmental & Planning Law, Man/Environment Department, University of Waterloo

Winter/Spring
1981:

Adjunct Lecturer, Introduction to Environmental and Planning Law, Man/Environment Department, University of Waterloo.

Winter/Spring
1982:

Adjunct Lecturer, Introduction to Environmental and Planning Law, Man/Environment Department, University of Waterloo.

Winter/Spring
1983:

Adjunct Lecturer: E.S. 201 - Introduction to Environmental and Planning Law and E.S. 402 - Planning Law, Man/Environment Department, University of Waterloo.

PRIMARY INTERESTS:

Environmental/Planning Law, teaching, legal research, writing, litigation.

PAPERS:

Garrod, S.R., "The Joint L.L.B./M.E.S. Program at York University - an evaluation by one who has done it". Published by the Faculty of Environmental Studies, York University, 1978.

Garrod, S.R., "Final Synthesis Paper: Environmental Law". Published by the Faculty of Environmental Studies, York University, 1978.

RESEARCH PAPERS:

Estrin, D. and Garrod, S.R.: "Acid Precipitation: An Evaluation of Canadian and U.S. Environmental Laws and Recommendations for Regulatory Alternatives", for the Canadian Environmental Law Research Foundation, May, 1981.

GREGORY SCOTT WETSTONE

PERSONAL DATA

Address: 2300 40th Street, N.W. #1
Washington, D.C. 20007
(202) 338-9115

Date of Birth: September 12, 1953

Marital Status: Single

CURRENT POSITION

Director, Air and Water Pollution Program, Environmental Law Institute. Principle responsibilities include program development and fundraising, project direction, staff supervision, research, writing, and public speaking on studies and commentary concerning a wide range of environmental matters. Major projects include:

- o Coordination, editing, and co-authorship of ELI's three volumes on the current state of air and water pollution control law: Air and Water Pollution Control Law: 1982, Air and Water Pollution Control Law: 1980, and Air and Water Pollution Control Progress and Problems (1978). These manuals describe in detail the major Air and Water Act pollution control programs, and discuss the implications of recent developments. Key chapters include: "Administrative Law," "Ambient Air Quality Standards," "Prevention of Significant Deterioration," "Non-attainment," "Mobile Source Pollution," "Hazardous Air Pollution Standards," "National Pollutant Discharges Elimination System," "Publicly Owned Treatment Works," "Enforcement," and "Regulatory Reform."
- o Director, "Control of Sulfur Dioxide Pollution in North America and Europe." A study for the German Marshall Fund of the United States analyzing the air pollution control regimes of the major industrial nations of Europe and North America, and their effectiveness in controlling international sulfur dioxide pollution problems.
- o Director, "Institutional Aspects for Transported Pollutants." A study for the National Commission on Air Quality analyzing the impact and effectiveness of nine potential legislative programs to improve control of long range air pollution problems under the Clean Air Act.
- o Director, "Air Pollution Across National Boundaries." A study for the U.S. Congress Office of Technology Assessment examining international law and related mechanisms potentially useful in the development of an effective response to international environmental problems. Emphasis was placed on possible avenues of Canadian recourse to promote abatement of transboundary acid rain, and on the impact of the response to acid rain in North America on efforts to resolve more complex international or global pollution problems (emerging CO₂, ozone depletion problems, ocean pollution, acid rain in Europe).

OTHER PROFESSIONAL EXPERIENCE

Senior Staff Attorney, Environmental Law Institute, June 1980 - Jan. 1982, Staff Attorney since May 1978. Summer Associate May - Aug. 1977.

Clerk, Ragsdale, Liggett & Cheshire; Raleigh, North Carolina; August - December 1977.

Researcher, Copyright Law, Professor David Lange, Duke University School of Law, May 1976 - May 1977.

EDUCATION

Duke University School of Law, Durham, North Carolina. J.D., May 1978.

Florida State University, Tallahassee, Florida, September 1972 - June 1975. B.S. in Biology.

Smithsonian Tropical Research Institute, Balboa, Canal Zone, Fall, 1974.

Georgia Institute of Technology, Atlanta, Georgia, September 1971 - June 1972.

EDUCATIONAL HONORS AND ACTIVITIES

Law School
Clinical Program
Editorial Board, Duke Law Journal
Scholarship Recipient

Undergraduate
Phi Beta Kappa
Phi Kappa Phi Honorary Fraternity
Honors Program
Magna Cum Laude
Honor's Scholarship

SELECTED PUBLICATIONS, PAPERS, AND SPEECHES

"The European Response to International Air Pollution: Dead Trees Make A Difference In West Germany" Transatlantic Perspectives (forthcoming).

Acid Rain in Europe and North America: National Responses To An International Problem, 210 p. (forthcoming, ELI).

"Alternatives for Coping With Acid Deposition," Environmental Policy and Law 155 (Nov. 1981).

Editor and Co-author, Air and Water Pollution Control Law: 1982 (ELI, Nov. 1981); a 700-page examination of air and water pollution law with emphasis on the 1977 Air and Water Act Amendments and subsequent regulatory, judicial, and technical developments.

"Protecting Visibility Under the Clean Air Act: EPA Establishes Modest 'Phase I' Program," 11 Environmental Law Reporter 10054 (February 1981).

"A Review of Approaches to the Control of Long Range Air Pollution Transport in the United States, Canada, Europe and Japan." Report prepared for the U.S. Congress, Office of Technology Assessment, Robert Friedman, Project Officer (January 1981).

With Phillip D. Reed, "Institutional Aspects of Transported Pollutants; An Examination of Transport Reduction Strategies." Study prepared for The National Commission on Air Quality; David Calkins, Project Officer (February 1981).

"Environmental Issues Affecting the Global Commons," paper presented at the Fifth Meeting of U.S. and U.S.S.R. Specialists on Legal and Administrative Aspects of Environmental Protection, President's Council on Environmental Quality, Washington, D.C. (December 15, 1980).

"Regulatory Control of Hazardous Waste Management," appendix in An Economic Analysis of Alternate Approaches to the Management of Hazardous Waste, Study for the EPA National Environmental Research Center (Nov. 1980).

"Legal Aspects of the Long Range Air Pollution Transport Problem," National Academy of Sciences Seminar on Transboundary Pollution for the United States Department of State, Washington, D.C. (June 26, 1980). A similar presentation was given to the Canadian Parliamentary Subcommittee on Acid Rain at the Canadian Embassy, Washington, D.C. (September 19, 1980).

"Acid Rain and Air Pollution Control: The Need for a New Regulatory Approach," Environment (June 1980); reprinted in The Energy Consumer (Department of Energy, January 1981).

"Current Progress in Developing A Regulatory Response to Emerging Air Pollution Problems," American Law Institute/American Bar Association Continuing Legal Education Conference on Water and Air Pollution. Washington, D.C., May 2, 1980.

Editor and Co-author, Air and Water Pollution Control Law: 1980 (Environmental Law Institute, May 1980); 600 pages.

"Air Pollution Control Laws in North America and the Problem of Acid Rain and Snow," 10 ELR 50001 (Jan. 1980); reprinted in the Current Issues in Environmental Law (Environmental Law Institute, 1980).

"Development of an International Legal Remedy to the Acid Precipitation Problem," Action Seminar on Acid Precipitation, November 2, 1979, Toronto (Proceedings Published).

"Federal Statutory Directives Concerning Hazardous Materials," appendix in Ng and Davis, Strategies for Public Health: Promoting Health and Preventing Disease (Van Nostrand Reinhold, 1979).

Editor and co-author, Air and Water Pollution Control: Progress and Problems (Environmental Law Institute, 1978), 650 pages.

"A Critical Examination of Federal Regulatory Efforts to Control Toxic Substances," Background paper for the Toxic Substances Program of the Environmental Law Institute (August 1977).

With K.L. Heck, "Habitat Complexity and Invertebrate Species Richness and Abundance in Tropical Seagrass Meadows," 4 Journal of Biogeography 135 (1977).

PROFESSIONAL ACTIVITIES

Member, Joint Scientific Committee on Acid Precipitation of the National Academy of Sciences and the Royal Society of Canada.

Panelist, "Energy and the Clean Air Act," Wingspread Conference Sponsored by the Institute of Ecology and the Johnson Foundation; Racine, Wisconsin; March 10-11, 1981.

Panelist, "International Conference on Acid Deposition," Chicago, Illinois, May 19-20, 1981.

Member, National Coal Policy Project, Mining Task Force. The project, sponsored by the Georgetown Center for Strategic and International Studies, sought to define areas of agreement between industry and environmental sectors in the formulation of a second federal coal policy. The result was a three volume discussion of issues and recommendations, Where We Agree (Westview Press 1979).

Guest, "Congress and the Clean Air Act," University Forum Radio Show, WASH AM/FM, Washington, D.C., June 4, 1981.

Panelist, "Acid Rain and the Atlantic Salmon," Portland, Maine, Nov. 22-23, 1980 (Proceedings Published).

Participant, "The Political and Legal Implications of a U.S., Canada Air Quality Accord," workshop sponsored by the Canadian Institute of International Affairs, Toronto, Dec. 12, 1981.

Judge, Niagra International Moot Court Competition final rounds, London, Ontario, February 13, 1982.

AFFILIATIONS

American Association for the Advancement of Science
American Bar Association
District of Columbia Bar Association
American Society of International Law
Society for Occupational and Environmental Health