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SPEECH

Physical Dimensions and Solutions of the Acid Rain Problem

*by Raymond M. Robinson**

I'm pleased to be in Cleveland today and to have the opportunity to address the City Club Forum on behalf of the Honourable John Roberts, Canada's Minister of the Environment.† He asked me to emphasize his deep regret at being unable to be with you today. I can however assure you that what I am about to say carries his support. In Environment Canada we deal on a regular basis with a number of unpopular items: industrial wastes, toxic chemicals, pollution of the air, water and soil. Perhaps the most difficult of these is acid rain.

Acid rain affects both of our countries. It is a very subtle kind of pollution. The effects take place gradually. People living beside a lake begin to notice that there aren't so many fish being caught as there used to be. Then one day, there are no more fish at all. The effects take years to show up but when they do it is normally too late to correct the situation.

Perhaps the best way to begin is to describe the problem, and then to explain the challenges we face in dealing with it. Acid rain is a well known phenomenon in Europe where it's been observed for many years. It is caused by the release into the atmosphere of sulphur dioxide and oxides of nitrogen from such sources as thermal generating plants and non-ferrous smelters but also from vehicles and other industrial activities. These chemicals frequently go far aloft, particularly where high stacks are used, undergo chemical changes, and then come down hundreds or even thousands of miles away in the form of sulphate or nitrate, both of which are highly acidic.

A large and growing number of lakes in Canada and the United States are now so acidified, that they can no longer support fish and related forms of life. They are effectively dead. Hundreds of thousands of lakes in Canada could face a similar fate over time because the geological formations around them are steadily losing their capacity to neutralize

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† Speech before the City Club Forum, Cleveland, Ohio, March 27, 1981.

the acid falling on them year by year.

Acid rain adds to the effects of local pollutants and attacks building surfaces, monuments and other outdoor structures. In fact, the Parliament Buildings in Ottawa are particularly hard hit. We don't have any current estimates yet of the cost of this kind of damage, but it must be very large. In Europe this is viewed as one of the most serious effects of acid rain.

Over the long term some drinking water supplies may be contaminated by toxic metals leached by acid rain from the soil. Some ground water supplies already have been contaminated in certain localized areas.

Some crops have been damaged by artificial exposure to highly acidic depositions, under experimental conditions.

Magnesium and calcium are being leached at an accelerated rate by acid rain from forest soils which, in Canada, are already nutrient poor. Normally these key elements for tree growth would be replaced by decomposing forest litter, but recent scientific observations suggest that high acidity is slowing down this decomposition process. This could seriously affect the productivity and yield of our forests, particularly over the long term.

These effects, and others I have not cited, are not merely aesthetic - although aesthetic damage is serious enough - there is potentially a very heavy economic penalty in acid rain and it extends far beyond sports and commercial fishing and the hunting lodge and tourist businesses, important as these are to a great number of people in my country - and indeed to our economy as a whole.

When I say that acid rain could affect the productivity of trees, I am talking about a resource that is a prime generator of economic activity in my country, employing ten per cent of our labor force. In our northern latitudes, with relatively poor soil, our forest productivity, from an economic perspective, is already marginal. Even a small reduction in that productivity could seriously affect our national competitiveness. No Canadian Government can tolerate such a threat.

Right now, about eight million tons of sulphur dioxide or its derivatives are falling on Canada every year, mostly in the eastern half of the country. About half that amount of oxides of nitrogen and their derivatives are also falling on us. Far more of both pollutants is falling on the U.S. Let me, before talking about the international dimensions of this problem, tell you what we in Canada are doing in response to it.

Like the U.S., we have a federal program to promote the conversion of oil-fired thermal plants to coal. It is coupled with a clear statement that any increase in the use of coal must not harm the environment. Our current administrative target (it's not a legal requirement) is to reduce SO₂ emissions by 50 percent when converting a plant from oil to coal. We believe, and economists bear out the truth of what I am saying, that there is such a large economic benefit in switching from high cost imported oil to domestic coal that we can then afford the cost of making sure that we

do not harm the environment any further in the process. Indeed we can afford to help the environment.

The largest single producer of acid rain emissions in Canada is INCO's huge smelting operations in Sudbury, Ontario. Uncontrolled, that smelter would produce 7200 tons of sulphur dioxide a day. It has been operating at 50 percent control for several years. Regulations issued late last year have reduced Inco's legally allowable emissions from 3600 tons a day to 2500 tons a day, and that is to drop to 1950 tons next year. My experts believe we can get the emissions down to less than 1000 tons in future years. That would be approaching 90 percent control. A new copper smelter under construction in Timmins, Ontario will have 97 percent sulphur dioxide removal.

On another front, new regulations have just been issued which require Ontario's thermal power stations to reduce their total sulphur dioxide emissions by 43 percent during this decade, despite expected growth and the demand for electricity in Canada.

Canada's Parliament has also unanimously enacted, with unprecedented speed, an amendment to the Canadian Clean Air Act broadening federal authority over pollutants crossing international boundaries. We hope that provincial control actions will make that authority unnecessary but it's there if needed.

Unfortunately, atmospheric computer modelling tells us that at least half of the acid rain falling on Canada originates from emissions released in the United States. In some particularly badly hit areas such as the Muskoka-Haliburton tourist and cottage region north of Toronto, the U.S. proportion of the total deposition approaches 70 percent, most of it from the Ohio Valley.

This means that no matter what we do in Canada—and we're moving to reduce our emissions as I've stated—we cannot resolve the problem ourselves. We need the cooperation of your country.

It doesn't take much imagination to see that, in the absence of any corrective action, the situation is going to get worse. The switch to coal from oil in thermal power generation in the United States and the growth of your power needs could lead to significant increases in acid-causing emissions in your country. Even if there were no increase in emissions, the effects will worsen because our sensitive environment is already being seriously overloaded with these acids. Acid deposition is cumulative in its effects. It steadily wears down resistance. What that means is that our target of concern must be current emissions from existing sources.

Let me be even more pointed. I am talking about the power plants with their high stacks in Ohio and other coal-producing states. Most of these are minimally controlled and most burn high sulphur coal. If they did not have high stacks to disperse the pollutants - to send them next door - the local impact would not be tolerable by the standards of modern society. Now I am not preaching from high moral ground here. The biggest stack of all on the largest single polluter of all is in Sudbury, Ontario,

the INCO smelter. And that high stack has been really effective - conditions have improved dramatically in the Sudbury area since its construction. But we now know that the use of the high stack not merely changed the geographic location of the pollution problem - to Quebec and the Adirondacks, among other places - it actually helped worsen the problem. The sulphur dioxide stayed aloft much longer and therefore had time for more of it to be changed into the much more acidic sulphate. You have read in the press here in Celveland - and elsewhere in the U.S. - that we cannot tie the emissions from the high stacks of the Ohio Valley to acid deposition in Canada - that it's just speculation. I say to you bluntly that that contention, inspired by utility interests, is a deliberate attempt to blur responsibility, to promote delay.

Thanks to such advances in technology as weather satellites and ever more sophisticated computers - and my atmospheric scientists have the use of the best computer in Canada - we can track the movement of air masses with remarkable accuracy. We've followed INCO's plume - the plume from one stack - over 400 miles. And thanks to measurements by specially equipped aircraft, as well as lab experiments, we can calculate what is going on inside those air masses. We can estimate, for example, the rate at which sulphur dioxide is being transformed into highly acidic sulphate. And our extensive analysis of the rain is used to corroborate these calculations. Let me be very specific. In the summer most of our weather patterns come up from the south - often sweeping up the Ohio Valley and over Ontario into Quebec. As the air moves over pollution sources, it picks up sulphur dioxide and oxides of nitrogen. Often in the summer in eastern North America we swelter under stagnant highs - a perfect condition to promote the transformation of SO₂ into sulphate. That haze we see on such days - a visibility so sharply lowered that small planes cannot fly - is no purely natural phenomenon - it comes right out of those stacks. And what goes up comes down - either in dry deposit or highly acidic rain - both are equally bad.

It is true that when we are dealing with a multiplicity of SO₂ sources in a region, we cannot distinguish the impact of one particular source on a lake hundreds of miles away. That is the basis of the utilities' contention that the case is not proven. But in order to bring about a reduction in the problem - to ease the burden of acid loading - we do not need that degree of precision. We need only deal with total loadings because it's the total - the sum of individual contributions - that is causing the problem. In short, what we need are major generalized reductions in the principal source regions and the knowledge we have now is more than good enough to identify those.

Let me address a particular word to the coal mining interests. I know that some among you are beginning to worry about the growing relationship in the public mind between burning coal and acid rain. The two are increasingly becoming synonymous. This could hurt the image of coal as an energy source as concern about acid rain grows. And let me add that

the Government of Canada is going to do everything it can to ensure that that concern does grow. This is particularly unfortunate from a coal mining perspective because it is so unnecessary. Technology exists now to reduce by 90 percent or more the SO₂ emissions from the combustion of sulphur-bearing coal. Coal need not carry the stigma of acid rain. I urge coal miners to look to the long term future of their industry as well as their country, to realize that acid rain is not going to disappear and to join us in urging that coal be burned cleanly.

Let me say a word about control technology. Scrubbers work if they are run by people who have the expertise to operate them. The successful experience of Louisville Gas and Electric Company shows that very clearly! What are needed are chemical engineers. Many of the utilities which have had difficulty running their scrubbers tried to use other engineering disciplines to manage what is a complex chemical process. Whether this stemmed from their professional conservatism or a desire to show that these unwanted devices won't work, I don't know. But if the utility executives persist in contending that scrubbers won't work, I would be happy to send them a list of plants where they are working very satisfactorily. May I also add that scrubbers are needed. The sorts of global reductions required to bring acid loadings within barely tolerable bounds will not be achieved by coal washing and fuel substitution alone.

I would not normally be so pointed in discussing matters within the United States. But we are dealing here with a phenomenon that knows no boundaries and our stake, proportionately speaking, in what you do is even greater than your own. That gives me boldness to say something else of an even more political character. Your Clean Air Act is currently being reviewed in Congress and one of the issues scrambling for attention is acid rain and the United States' international obligations. There are indications that even those who favor major reductions of authority under that act recognize the special character of pollution problems between states and between countries. Indeed the case can be made - and I would certainly make it in my own country, which like your own has a federal structure - that if the onus for decision-making on local pollution is shifted to the state or provincial authorities from the federal level, then a strengthening of federal authorities from the federal level, then a strengthening of federal authority is needed to address pollution that crosses state or provincial boundaries. The bottom line of my comment is this - any way you cut it, acid rain is going to be controlled on a national or international basis. It would be very much in the long term interest of states with major high sulphur coal deposits to promote a specific congressionally financed acid rain control program that would allow those deposits to be used in the future. Such a program, if the financing were adequate, would also be in the interests of the utilities and the electric power consumers.

Now what I've been saying about the effects of acid rain is not just my opinion, it's a matter of scientific evidence, attested to by experts in

both the United States and Canada. Acid rain is a *real* problem, and it was recognized as such by both our governments in a Memorandum of Intent signed on August the 5th, 1980, which committed both our countries to work towards a bilateral air quality agreement. And the seriousness of the problem has been strongly confirmed in interim reports just released by work groups formed under the Memorandum of Intent. Those work groups are preparing a common information base for both countries to use in negotiating an air agreement. The negotiations will begin this summer, as agreed by President Reagan during his visit to Ottawa earlier this month.

My Minister tomorrow will be addressing the Canada-United States Law Institute here in Cleveland on acid rain but with a somewhat different emphasis. I have today concentrated on what might be called the physical dimensions of the problem and of its solutions. Tomorrow, while also describing the problem, the Minister will emphasize some of the relevant principles and practices in international law. It might be useful before concluding today to remind you that there are some important principles governing the conduct of relations between sovereign nations that cannot be separated from the question of acid rain. The central issue in that regard is the extent to which our two countries in seeking solutions to the acid rain problem will be guided by a desire to promote the rule of law between nations. Let me illustrate.

The Stockholm Declaration of 1972, signed by a large number of countries including the United States and Canada - indeed both of us were principal "movers" of the Declaration - contains the following principle - number 21:

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction.

Let me cite another principle, this time arising out of an international arbitration proceeding between Canada and the United States in the 1930's. The circumstances are particularly relevant since the issue being addressed was damage to U.S. crops from fumes emitted by a Canadian smelter in Trail, British Columbia. The Arbitration Tribunal not only required compensation to be paid to the farmers affected, it also imposed on the smelter stringent controls on sulphur dioxide emissions which are still in force today. Here is a quote from the Tribunal's findings:

Under the principles of international law, as well as the law of the United States, no state has the right to use or permit the use of its territory in such a manner as to cause injury by fumes, in or to the territory of another, or the properties or persons therein, when the case is of serious consequence, and the injury is established by clear and convincing

evidence.

I shall cite one more principle. Article IV of the Boundary Waters Treaty of 1909 specifically prohibits polluting water "to the injury of health or property" across the boundary. That principle, which has served us well for seven decades, is the basis for the Great Lakes Water Quality Agreement which is of such importance to you in Cleveland and to my Minister's constituents in Toronto. It is the one principle of the three cited which is embodied in a Treaty but it deals only with water pollutants. Even though acid rain ends up as a water pollutant, I know that an enthusiastic defense attorney might seek to argue that these principles do not therefore constitute obligations. Is such an argument appropriate to nations seeking to encourage the rule of law in their dealings with other countries? I hardly think so and I am sure that responsible Americans would agree with me. The concept that one nation or person should seek to avoid damaging another is basic to the societies which exist in both our countries. The opposite is unthinkable. It is really the rule of force - might is right. That is why I say that acid rain constitutes a test of the rule of law in the relationship between Canada and the United States. I am confident that, together, we will meet that test and in the process overcome what must surely be one of the worst environmental problems we have yet encountered.