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CANADA'S ACID RAIN CONTROL PROGRAM

Acid rain has been called the greatest environmental threat that Canada has ever faced. The rains and snows that were once cleansing and pristine have now become, as a result of human activity, dangerously acid and destructive. Scientists have firmly established that the primary cause of acidification is SO_2, with NO_x emissions also a significant factor.

The main sources of sulphur oxide emissions in North America are coal-fired power generating stations and non-ferrous ore smelters. The main sources of nitrogen oxide emissions are automobiles and other vehicles.

Acid precipitation can have many harmful effects. It can increase the acidity of lakes and streams to a point where fish and other aquatic creatures such as frogs and salamanders cannot reproduce - ultimately, they become extinct in overly acidified bodies of water. Acid rain can also increase the acidity of soils and, particularly in combination with other atmospheric pollutants such as ozone, is suspected of slowing down the growth rate of trees or making them more vulnerable to disease. Acid rain erodes buildings and monuments, including those of cultural significance, causing millions of dollars worth of damage annually.

The fishery, tourism, agriculture and forestry resources at risk due to acid rain sustain about 8% of Canada's Gross National Product.

The environment is important to Canadians for both economic and social reasons. Public concern for the quality of the environment has been growing, and acid rain is now the issue highest on the public's environmental agenda.

Early warning of the knowledge of the sources and effects of acid rain came from Canadian studies started in the 1950's and 60's. At that time, the major concern was damage from local air pollution. In the early 70's, both Canada and the U.S.A. passed clean air acts and implemented various control programs. As a result, SO_2 emissions were reduced in Eastern Canada by about 27% between 1970 and 1980, with comparable reductions in the U.S.A.

However, it was clear in 1980 that measures to reduce local pollution were not sufficient, and that much of the damage to aquatic ecosystems was due to long-range transport of air pollutants, from both Canadian and U.S. sources. A Memorandum of Intent was signed between the two countries agreeing to negotiate a transboundary air pollution agreement "including the already serious problem of acid rain". A working group of scientists under the Memorandum established that damage occurred where wet sulphate deposition exceeded 20 kg/ha/yr in moderately sensitive aquatic ecosystems.

By 1984 it was clear that the U.S.A. would not be implementing an acid rain abatement program so Canada decided to proceed unilaterally and to strongly support international efforts to develop a specific agreement for SO_2 reductions. By this time estimates showed that 14,000 lakes in Canada were acidified and over 300,000 were vulnerable to chemical and biological change from acid deposition. Fishing, tourism, agriculture, forests and possibly human health were affected.

In response to this environmental crisis, in March 1985, Canada launched the most ambitious environmental program in its history, based on a combination of good science and political commitment.

The key components of that program are:

- an acid rain policy based on achieving an environmental objective, that is, no more than 20 kg/ha/yr of wet sulphate deposition for moderately sensitive areas;

- a commitment to reduce sulphur dioxide emissions in eastern Canada by 50% by 1994;

- new motor vehicle emission standards comparable to U.S. standards;

- the largest and most comprehensive scientific research and monitoring effort ever undertaken by Canada in the environmental field. Current expenditures equal $30 million or $1.20 per capita, with more than $18 million contributed by the federal government.

- cooperation among federal and provincial governments, the private sector and citizens of all ages.

The Canadian constitution, which defines the federal and provincial jurisdictions, requires a particular approach to the acid rain problem. In Canada, the responsibility for regulating stationary sources of air pollution rests with provincial governments. The responsibility for controlling emissions from vehicles (cars, trucks and busses) is a shared one: the federal government defines standards at the manufacturing stage and provincial governments regulate and inspect motor vehicles thereafter. The transboundary aspects - interprovincial and international - of acid rain are of particular interest to the federal government. Both levels of government are concerned about the economic and environmental damage being caused by acid rain.

Canada's efforts to control acid rain are concentrated in the seven eastern provinces: Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland. Much of the SO_2 produced in Canada originates within this area and prevailing winds transport the pollution towards the eastern portions of the country.

Canada's governing system is one of co-operative federalism and the strengths of that system have now been brought to bear on the threat of acid rain.

- In March 1984, federal and provincial environment ministers agreed to a two-phase emission reduction program, cutting 1980 SO_2 emissions by 25% by 1990 and a further 25% by 1994. Again, scientific research indicated that by cutting eastern Canada's SO_2 emissions by 50% (or to 2.3 million tonnes per year based on 1980 emissions of 4.6 million tonnes) and with compatible emission reductions in the United States, acid deposition could be limited to the accepted (20 kg/ha/year) target in many areas.

  To meet the 1990 goal, provincial governments in Ontario and Quebec regulated emission reductions at INCO (Sudbury), Ontario Hydro, Noranda (Rouyn) and Noranda (Murdochville).

- In February 1985, an agreement was reached by the Ministers of the Environment of Canada, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia and Newfoundland. Prince Edward Island supported their decisions. The agreement spelled out how much emissions will be reduced in each province in order to meet the 1994 target date. The federal and provincial governments further agreed to support financially, to the

extent necessary, the abatement efforts needed to meet emission reduction targets.

- One year ago, the federal government agreed to tighten standards for automobile emissions. The standards, which will have the effect of reducing nitrogen oxide emissions by 45%, will apply to all new cars and light duty trucks of model year 1988. High performance catalytic converters will be necessary on all new 1988 model light-duty vehicles sold in Canada. The government is also investigating tighter emission standards for trucks, buses and other heavy vehicles.

Each provincial government now has identified the SO_2 emission reductions it must achieve to safeguard the Canadian environment from acid rain - and each has committed itself to make those cuts. The process of developing regulatory orders is underway.

Quebec announced its emission control plans on February 8, 1985, modifying its Environmental Quality Act. These apply to automobile emissions, the combustion of fossil fuels, and smelting operations. Quebec's sulphur emissions will be cut back by 45% overall. In some cases, actions must be initiated immediately to respond to the regulations.

- existing continuous reactor smelting facilities must reduce SO_2 emissions from 1980 levels by 35% by 1989 and 50% by 1990;

- all other existing smelting facilities cannot emit more than 275 kilograms of SO_2 per tonne of mineral concentrate;

- all new smelting facilities must control 95% of the sulphur contained in the concentrate or ore being processed.

The implementation of these regulations means that Quebec will have done its share in helping Canada meet the 1994 reduction target.

The Government of Ontario launched its "Countdown Acid Rain" program in December 1985. The program contains stiff controls on sulphur emissions from the province's four largest producers and gives them strict, yet realistic, guidelines by which they are to reduce dramatically by 1994. By that year, Ontario's production of SO_2 will be 885 kilotonnes (kt) annually or lower, down from 2,192 kt in 1980. The companies affected by the new controls must

also meet strict reporting deadlines in the interim, so that their progress can be monitored.

Ontario's new plan is an integral component of last year's federal-provincial agreement to slash eastern Canada's SO_2 emissions. Since Ontario alone is responsible for about 50% of Canada's emissions, this new control program is a major breakthrough in the battle against acid rain.

The capital cost of designing and installing acid rain control measures to reduce emissions by 50% is about $1.5 billion, of which $750 million may be spent in the nickel and copper smelting industry.

Industry has the primary responsibility for carrying these costs. Federal and provincial governments have agreed to provide financial assistance to those companies whose economic situation does not permit them to bear the cost of pollution controls entirely on their own.

Other components of the acid rain control program include:

- Providing $150 million for emission controls at smelters: These funds, to be matched by the provinces, are to be made available to industry for modernization initiatives which include pollution controls.

- Assuring $25 million for technology development and demonstration at smelters: these funds have been established for smelter research and development, and are in addition to a comparable amount invested by smelting companies. One example of such industrial research is the test of a chemical leaching process by Hudson Bay Mining and Smelting. The process offers both economic and pollution control benefits, and has the potential to remove from the environment over 70 kilotonnes of SO_2 emissions annually.

- Investigating increased use of low-sulphur coal from Western Canada: a federal-provincial task force will shortly report on the economic and environmental impact of increasing the use of low sulphur Western Canadian coal in Ontario.

- Assuring $70 million for cleaner, more efficient use of coal: in the past year, Energy, Mines and Resources Canada has spent about $50 million

researching new, cleaner methods of burning coal. The research projects include:

- experiments on fluidized bed combustion, a process for burning coal that minimizes the production of SO_2 and NO_x;

- coal-water slurry experiments, involving the mixing of water with coal before it is burned, thereby minimizing emissions; and

- tests of a process called limestone injection multi-stage burning, whereby limestone, which is alkaline, is introduced into the combustion chamber and neutralizes acids released during coal combustion and also reduces NO_x emissions.

These experiments are being conducted at Gagetown and Chatham, New Brunswick; Victoria Junction and Point Tupper, Nova Scotia; and Summerside and Charlottetown, Prince Edward Island. It is expected that the lessons learned from these projects will help industries across Canada meet their emission reduction targets.

. Research and monitoring - $30 million a year with $18 million of this guaranteed by the federal government. A priority in the fight against acid rain is the development of a systematic, co-ordinated environmental monitoring system, which is currently being worked on by federal and provincial scientists and other officials. Data collected by such a network, over a period of years, is vital because it enables scientists to determine the status of the environment and identify changes in pollution levels. Thus, science will help legislators determine the extent of the beneficial effect of the control program.

Public support for action on acid rain continues to be high. A majority of Canadians stated in a survey that they were willing to give up a day's pay in order to fight the scourge of acid rain.

But even with the ambitious program and the wide support from all sectors of Canadian society, not all areas of Canada will be protected. Approximately 50% of the sulphur dioxide in the Canadian atmosphere has its origin in the U.S.A. Southern Ontario is subject mainly to transboundary impacts, and even a 100% reduction in Canadian SO_2 emissions would not help this area.

In the autumn of 1985, the federal and provincial governments jointly sponsored a major international symposium on acid precipitation, called "Muskoka '85". Over 600 scientists from 18 nations attended the week-long conference. Their findings reconfirmed that acid rain is a serious problem, the solutions to which are not only possible but economically necessary. The findings revealed at Muskoka '85 offer a firm basis for political action to control acid rain.

In March 1985 the Prime Minister of Canada and the President of the United States personally appointed Special Envoys to review and make recommendations on the bilateral acid rain issue. Their report was endorsed by the leaders in March 1986. The report stated that acid rain from SO_2 is a serious environmental and transboundary problem, and made several recommendations on initial steps towards solving the problem. Canada will continue to press for a program of SO_2 reductions in the U.S. to reduce the transboundary flow into Canada, sufficient to meet the established environmental target of 20 kg/ha/yr or less of wet sulphate deposition.

Canada will also continue to strongly support the development of further specific agreements and protocols to reduce the widespread threat of acid rain worldwide. Scientists are continually improving their understanding of the sources, movement and impacts of the components of acid deposition. Science has also pointed to the emission reductions necessary to meet the objectives. This knowledge, combined with political will on the part of member countries, will help to generate the kind of international cooperation needed to protect the global environment.