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Notes for a speech by
Douglas Roche, Ambassador
for Disarmament, to
Project Ploughshares
"Nuclear Winter: A View
from Saskatchewan".

SASKATOON

July 16, 1985

Nuclear Winter: A View from Saskatchewan

**By Douglas Roche
Ambassador for Disarmament**

**An Address to
Project Ploughshares**

**Saskatoon, Saskatchewan
July 16, 1985**

Visiting this vast and beautiful province makes one vividly aware that agriculture and farming of all types is an integral part of life in Saskatchewan. As is well known, Saskatchewan produces 60 percent of Canada's total wheat crop and most of the country's canola, rye, barley, oats and flax.

Supplying 20 percent of the global wheat market, Canada is, in fact, the world's seventh largest producer of wheat. More than 50 percent of our agricultural exports are in grain; grain exports -- which represent 5 percent of Canada's total exports -- were worth \$5.5 billion in 1984.

It is interesting to note that Canada finds its largest single wheat market in the Soviet Union; exports to that country were valued at \$2.2 billion last year. Canada -- and significant sections of the world -- depend on the abundant harvests from this land.

In an agricultural community, weather assumes a special significance. It requires constant monitoring and analysis. It must be both understood and anticipated. Too little rain or too early frost can mean disaster to a crop which is sensitive to minor variations in temperature and precipitation. In Canada, we cultivate our crops on the very margin of permissible climatic conditions. The prairies lose their capability for maturing wheat when the temperature decrease is slightly more than 2 degrees celsius for wheat and 4 degrees for barley. Weather is a constant concern to farmers.

Here then, in this land so bountiful in its harvest, and yet so vulnerable to the climate, is an appropriate place to consider the full meaning of "Nuclear Winter."

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In 1971, the Mariner 9 space-probe began orbiting Mars and transmitted to Earth photographs of a planet enveloped in the dust of a Martian storm. Astronomers, planetologists and geologists studying this phenomenon recorded that the surface temperature of the planet was lower than that of the dust in the upper atmosphere.

Drawing on this data, scientists, including the pre-eminent astronomer and author of Cosmos, Carl Sagan, determined that there might be similar effects on Earth should vast amounts of dust and smoke be released into the atmosphere as a result of volcanic eruptions, mass forest fires or a major nuclear exchange. Follow-up work,

including scientific modelling, furthered the hypothesis that catastrophic cooling could occur on Earth in these circumstances.

In 1982, scientists Paul Crutzen of West Germany, and John Birks of the United States published the first major study of the effects of smoke generated by a nuclear war. They concluded that forest fires caused by a major nuclear exchange would emit hundreds of millions of tonnes of smoke which would severely reduce the amount of sunlight reaching the earth's surface.

Based on this study, a group of U.S. scientists and biologists undertook the first comprehensive analysis of the phenomenon which came to be known as Nuclear Winter. They examined not only the climatic effects of nuclear war but also for the first time possible biological effects and the impact on human life itself.

This study, "The Long-Term Atmospheric and Climatic Consequences of a Nuclear Exchange" (known as "TTAPS" after the initials of the names of the authors: Turco, Toon, Ackerman, Pollock and Sagan), became the basis for a major scientific symposium in April 1983 which brought the Nuclear Winter theory to international attention. A group of more than one hundred scientists from the United States and other countries, reviewing the findings of the TTAPS study, declared their general agreement with the Nuclear Winter hypothesis.

A number of biological scientists, examined the potential impact of post-nuclear war conditions on the Earth's life-support systems. Discussing the effects on plant life, animal life, marine and fresh water eco-systems, climate, weather and soil preservation, they agreed that the effects of nuclear war "could be devastating to a degree previously unforeseen." They could not rule out the possibility that:

"...the long-term biological effects of nuclear war could cause the extermination of humankind and most of the planet's wildlife species."

In order to make the startling details of Nuclear Winter widely known to the public, as well as other scientists and policy-makers, a major conference was convened in Washington in October 1983. The "Conference on the World after Nuclear War" attracted more than 600 participants, including scientists, ambassadors and officials from more than twenty countries, educators, religious leaders, business people, environmentalists and arms control, foreign policy and military specialists. This conference brought the Nuclear Winter theory out of the laboratories and into the headlines.

The conference ended with a live satellite linkage between Washington and Moscow consisting of a 90-minute exchange of scientific information and views on Nuclear Winter. During the exchange, the principal scientific secretary of the USSR Academy of Sciences, Gregori Skryabin, said that American and Soviet scientists had reached a consensus:

"They are unified in their views that there should be no nuclear war, that this would mean disaster and death for mankind...and we should all try to bring our influence to bear in order to bring about an end to the arms race so there will never be a nuclear war."

At the end of the satellite link-up, conference moderator Dr. Thomas Malone expressed the hope that this frank exchange of views would be viewed as a turning point in the affairs of humankind and would "elevate the level of consciousness among policy-makers."

The origins of the Nuclear Winter theory, along with the proceedings of the conference and an elaboration of Nuclear Winter findings, were brought together in the book, The Cold and the Dark: The World After Nuclear War co-authored by Carl Sagan and Paul Erlich .

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The Canadian Government took note of the growing number of national studies produced by such respected institutions as the Swedish Academy of Sciences, the U.S. National Academy of Science and the U.S.S.R. Academy of Sciences. In spring 1984, the Minister of the Environment commissioned the Royal Society of Canada to study the environmental and ecological consequences of a nuclear war from a Canadian perspective.

The Royal Society of Canada, founded in 1885, is an 1,100-member interdisciplinary society which has participated actively in the learned scientific and academic affairs of Canada. Chaired by Dr. Kenneth Hare, Provost of Trinity College, University of Toronto, the Royal Society Committee on the Environmental Consequences of Nuclear War spent seven months studying the possible effects of nuclear war on the Canadian environment.

In February 1985, the Royal Society submitted its report: "A Canadian Appraisal of the Environmental Consequences of Nuclear War." The conclusions were in agreement with the findings of earlier studies undertaken by other major national scientific organisations:

"A nuclear winter in the wake of a major nuclear exchange appears to be a formidable threat. If calculations are correct -- and the Committee believes them credible -- temperatures in the interior of continents will plunge by many degrees after the exchange, probably far below freezing in many mid-latitude areas. Severe damage or destruction will ensue for crops and vegetation. The winter will last for some weeks to several months, and will have lasting repercussions."

The Committee of the Royal Society determined that the Nuclear Winter findings added new dimensions to established strategic thinking, and enumerated their own list of "Strategic Considerations" which included the following:

- The environmental impact of a major nuclear exchange would be global. No country would be immune;
- Nuclear Winter would imperil the food and drinking water supplies of all survivors in mid-latitude nations, and probably the whole world;
- There would be few spectators in a major nuclear exchange; non-combattant nations would be the helpless victims of a nuclear winter, just as would the combattants;
- Even if spared direct attack, there would be major damage to Canada's forests, fisheries and agriculture;
- The USSR would also be extremely vulnerable to the effects of a major nuclear exchange. Soviet agriculture, already very sensitive to drought and frost, could not survive a nuclear winter.

With respect to Canada, the report stated that:

- Canadian agriculture would be severely affected;
- Canadian forests would be vulnerable to radiation damage from fallout and could suffer extensive fire damage;
- There could be damage to ocean eco-systems and fisheries, including a possible loss of fisheries and non-commercial fish within two to six months.

Most significantly the report concluded:

"It is possible that long-term climatic anomalies caused by a nuclear war might hinder or prevent the re-establishment of pre-war (or indeed any) high-intensity agriculture in Canada."

The Royal Society report recommended that Canada investigate the Nuclear Winter hypothesis much further, concentrating on those areas that are of particular concern or relevance to Canada and in which Canada has a particular expertise i.e., agriculture, forestry and ocean resources. It also recommended that Canada support fully any action by the United Nations or other international agencies to facilitate greater understanding of the global implications of Nuclear Winter.

Upon receiving the Royal Society's report, the Government undertook an interdepartmental review of the Committee's findings. After several months of discussion and consultation among nine departments and agencies, including the Department of External Affairs, the Ministry of the Environment, the Department of National Defence, Agriculture Canada, the Department of Health and Welfare and the Ministry of Fisheries, External Affairs Minister Clark tabled the Government response in the House of Commons on June 27. Mr. Clark said:

"There is general agreement within the Government that the nuclear winter hypothesis is scientifically credible, even though the details regarding its magnitude and duration are subject to great uncertainties."

Mr. Clark noted that the Canadian study would be forwarded to the United Nations in accordance with a resolution on Nuclear Winter passed during last autumn's session of the General Assembly. Canada played a leading role in the adoption of this resolution, which urged all states and inter-governmental organizations to submit to the Secretary General scientific studies on the climatic effects of nuclear war. Canada stressed the importance for nations to undertake and report such findings as part of an "international undertaking to reduce the possibility of nuclear war."

As Mr. Clark stated in the House:

"The submission of the Royal Society's report to the United Nations will serve as a useful Canadian contribution to international recognition that in a nuclear war there would be no winners."

The Royal Society report makes clear once again the fact that a nuclear conflict would be catastrophic. This, Mr. Clark noted, "reinforces our basic conviction that any nuclear war must be prevented." Noting that the report has "national security implications," he reaffirmed Canada's commitment to NATO and to its policy of deterrence which "has ensured Canada's security for over 35 years." He stressed that the Royal Society report reinforced the basic conviction that "no nuclear war can be won in the traditional understanding of victory." Mr. Clark stated that the Canadian Government would therefore continue to do everything within its power to deter all war. This includes maintaining an active role in multilateral arms control negotiations in Geneva, Stockholm and Vienna, as well as supporting and encouraging the United States in its efforts to negotiate reductions in nuclear weapons with the Soviet Union .

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What, then, does the Nuclear Winter theory tell us about how to live in the nuclear age?

The world has known since August 6, 1945 -- the bombing of Hiroshima -- that nuclear weapons are the most deadly tools of war and that a nuclear war would wreak destruction life on a scale never previously witnessed or imagined. Now, a growing number of astronomers, biologists and physical scientists have informed us through the Nuclear Winter findings, that nothing less than the continuation of human life is at stake.

Of course, Nuclear Winter has not been proven beyond all doubt. Such proof can only be determined with certainty in the wake of an actual nuclear war. Nevertheless, a growing body of reputable, informed, scientific evidence makes it clear that anyone who would disregard the implications of Nuclear Winter is acting in a most reckless manner.

The consideration of the effects of Nuclear Winter must be taken into account by all policy-makers in all national governments. It must lead us to renew and redouble our efforts to reduce and eliminate all nuclear weapons from the face of the earth.

Nuclear Winter leaves us with profound questions for the future. We must begin to think seriously about our planet. Do we want Earth to be nothing more than a frozen, smouldering chunk of clay going about its galactic way -- no longer a shining beacon of blue light in outer space? Or do we want this planet, our home, to continue to glisten with the glories of nature and resound with the vibrancy of its inhabitants?

There is no better country in which to ask these questions than Canada, with its stunning beauty and immeasurable potential. And in Canada, there is no more appropriate place to ponder the future than in Saskatchewan, where the most bountiful glories of this planet are in full evidence.